Telephone Engineer

WITH WHICH IS CONSOLIDATED THE WESTERN TELEPHONE JOURNAL
ESTABLISHED 1902

VOL. XII | CHICAGO, OCTOBER, 1914 | No. 4

PUBLISHED MONTHLY BY THE
ELECTRICITY MAGAZINE CORPORATION
Monadnock Building, Chicago.

Ed J. Mock and Paul H. Woodruff, Editors.
TELEPHONES: HARRISON 3014-3015.

NEW YORK OFFICE.....1022 Longacre Bldg., 42d Street and Broadway
LONDON OFFICE.....36 Maiden Lane, Covent Garden
S. RENTELL & Co., Representatives.

Entered as second-class matter May 26, 1909, at the postoffice at Chicago, Illinois, under Act of March 3, 1879.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico.....Per year, $2.00
Canada.....Per year, 2.50
Foreign countries within the Postal Union.....Per year, 3.00
Single Copy..... .20

NOTICE TO ADVERTISERS.

Changes of advertising copy should reach the office of publication not less than ten days in advance of date of issue. Regular date of issue, the first day of each month. New advertisements will be accepted up to within five days of date of issue, but proof of such advertisements can not be shown in advance of publication.

NOTICE TO SUBSCRIBERS.

REMITTANCES.—Remittances should be made by check, New York draft or money order, in favor of TELEPHONE ENGINEER. Foreign subscriptions may be remitted direct by International Postal Money Order, or sent to our London office.

CHANGE OF ADDRESS.—The old address should be given as well as the new, and notice should be received two weeks in advance of the desired change.

CLUB RATE.—In acknowledgment of assistance rendered by subscribers in the securing of new orders, a club rate of $1.75 per annum is quoted. This rate applies to new subscriptions in clubs of two or more.

This publication is free and independent of all business or house connections or control. No telephone company, manufacturer or supply dealer, or their stockholders or representatives have any financial interest in TELEPHONE ENGINEER *or any voice in its management or policy.*

CHICAGO, OCTOBER, 1914

TABLE OF CONTENTS.

Editorial 147-149
What the Telephone Map Shows..... 147
Shoppiing by Telephone 147
Penny Telephone 147
Military Telephones 147
Stories in Pictures 150-151
Indiana Independents Convene 152
Extra Service and Few Men in England..... 152
How the "Telescribe" Works.....153-154
Under-Water Talk Between Forts 154
Carbondale Opens New Exchange..... 154
Army Lines of Communication. By Paul H. Woodruff.....155-156
International Electrical Congress 156
Investigation of Inductive Interference.....157-162
Telephone Order System for Handling Customers. By Harold Wright 163-165
Iowa Companies Must Obtain Franchises..... 165
Ornamental Disguise for Telephone..... 165
Uniform Methods of Toll Accounting. By W. S. Vivian.....166-168
Trade Directory of South America..... 168
The Telephone Scrap Book.....169-170
Line Interference Considered Legally. By Harold L. Beyer.....171-174
A. T. & T. Revises Expenditures..... 174
City of Chicago's Telephone Bureau..... 174
Public Utility Commission News.....175-177
European Telephone Development. By Fred W. Scholz.....178-182
The Law and the Telephone. By E. J. Wenner.....183-184
English Papers Install Special Service..... 184
Call Street Numbers for Telephone Numbers..... 184
A Discussion on Railway Telephony.....185-188
Oregon Commission Recommendation on Underground..... 188
Of Interest to the Trade.....189-190
Brevities of the Business 191-194

WHAT THE TELEPHONE MAP SHOWS.

SOME rather interesting figures are being made public in recent advertising of the American Telephone and Telegraph Company, under a heading the same as this editorial carries. The map of the United States which accompanies the advertising matter carries, at least hypothetically, a dot for every town where there is telephone service. The total number of such dots, or places they represent, is given as 70,000.

A rather striking paragraph of the advertisement is that "only a minority of the exchanges are Bell-owned, and the greater majority of the exchanges are owned by independent companies and connected with the Bell system." Supplementing this statement are figures showing that of the approximate 70,000 towns, only 23.5 per cent, or 16,450, are Bell-served exclusively; 56.8 per cent, or 39,760, are independent service with Bell connections; 10.5 per cent, or 7,350 are independent service without Bell connections; while 9.2 per cent, or 6,440, are served by two separate companies, presumably one Bell and one independent.

Along the same line of thought a high official of the Bell company has caused to be published the following statement: "In the United States there are 19,093 places or localities in which have been established telephone exchanges. Out of these 19,093 places the Bell system operates exclusively in 4,465. Independent companies operate exclusively in 11,885 localities. Or, in other words, independent companies have two and a half times as many exclusive exchanges as has the Bell system."

Of course these figures do not take into account the size of the exchanges or towns, and the Bell system undeniably has possession of the larger cities in most cases. But the fact that the Bell company, by its own statement, owns and operates exchanges in less than one-third of the total number of towns in the country (including the dual service points) may surprise a few of our citizens whose experience with the telephone is limited to their daily use of it.

According to this Bell advertising, the independents, Bell-connected and not Bell-connected, single service and dual service points, own and operate exchanges in 76.5 per cent of all the towns that have exchanges. In 67.3 per cent of the total, or 88 per cent of the independent territory, there is no Bell exchange at all. Conversely, the Bell companies own and operate in but 32.7 per cent of the total; and in only 23.5 per cent of the total, or 72 per cent of the Bell territory, is there no independent exchange.

The purpose of the Bell Company in publishing these

figures is obvious. They are intended to counteract the present tendency to regard large corporations as monopolistic, as well as put another spike in the coffin of the government ownership idea. Therefore, we can regard the numbers as authentic. Incidentally they should serve to restore some popular confidence in the right of the independents to recognition.

SHOPPING BY TELEPHONE

PEAK load days in city shopping, at least in Chicago, fall on Tuesdays, Fridays and Saturdays. The only one of these for which explanation is obvious is Saturday; it is the workers' half-holiday and the school children's only opportunity to get downtown. Tuesday and Friday have become "sale days" purely through habit, and without any particular reason.

At any rate, Chicago streets in the retail district on "peak load" days have become carriers of an "overload" charge of humanity. And the increase continues. Year by year the sidewalks become more crowded, and the literal hordes of pedestrians crossing from one side of the street to the other are more and more imperiled by the constantly augmented street traffic of electric cars, automobiles and motor trucks. It is not the difficulty of handling the present crowds, though that is great enough, but the problem of the future, when both street and sidewalk traffic shall have doubled, that is puzzling the students of city life.

We may take it for granted that the majority of those who fill the retail district sidewalks to overflowing are bent on shopping. Some of them may be sightseeing or just strolling; some of them, no doubt, are en route from one business office to another; some of them are there to sell goods to the shops that sell in turn to the majority. But with all these together, the sidewalks would still be empty. The thing that calls the crowds downtown is the advertising of the big stores; the weekly, almost daily "sales," each one of which is announced as an epoch.

But while the human jam increases, the telephone shopping habit grows apace. The very crowds themselves; the fact that a large proportion of us are imbued with some of what Kipling calls agoraphobia; the growing love of luxury and comfort; these things favor and encourage telephone shopping and discourage personal shopping. The telephone habit is beginning to grow faster than the personal buying habit; its curve shows an upward tendency while the crowd habit curve is flattening out. Some day they will cross, and then the telephone traffic will grow still faster while the sidewalk traffic gradually diminishes.

The telephone is the answer to the sidewalk congestion problem. It is not a solution that can be put into effect by city ordinance; it is a natural evolution. As a vehicle for shoppers the telephone will displace the sidewalk as the safety match has displaced the long run on a winter's morning to borrow a coal of fire. In twenty more years all of us will do eighty per cent of all our buying by telephone.

A few misguided observers have already protested that the housewife's telephone habit is responsible for a good part of the so-called increased cost of living. They have not pursued their meditations far enough to realize that every customer who stays at home and telephones means so much less space provided in the store for his accommodation. A store whose whole patronage was by telephone would be a very different and a much more economically operated enterprise than one whose entire custom comes upon the floor and insists on being shown a part of the stock.

When we consider the enormous ground values and consequent sky-high rentals that now obtain in the retail business districts of any large city, the much-quoted extravagance of modern delivery requirements melts away into an economy. It is cheaper, indeed, to hire private exchange switchboard operators and operate electric delivery wagons than it is to pay rent on the space the customer must occupy when he comes in person to the store. That this is not a mere academic statement is proven by many a grocer serving what is called a "high-class neighborhood," who does a big business in a small store and seldom sees any of his customers.

We hear a good deal for and against telephone shopping by people who imagine it to be a well developed characteristic of modern merchandising. As a matter of fact, telephone shopping is "still in its infancy," to use a threadbare but eloquent phrase. If telephone operating companies maintained a "new business" department, equivalent to that familiar adjunct of electric light central stations, their best opportunities would lie along the line of encouraging the people to use the sidewalk less and the telephone more in their buying of the necessities and luxuries of life.

PENNY TELEPHONES

CHICAGO has an organization, purely local in function, which rejoices in the title of "Penny Phone League." Its object is to prevent the acquisition, by the Bell telephone interests, of the Illinois Telephone and Telegraph Company, which owns and operates the independent automatic system in Chicago, and whose holding company (the Chicago Utilities Company) incidentally is said to have an option on the control of certain valuable automatic patent rights.

The Bell independent situation in Chicago has been commented upon before in these columns. All we need repeat of it here is that according to the terms of its franchise the Illinois Company's automatic system now belongs to the city of Chicago, to operate as a municipal system. That the city has not taken over the property, or shown any disposition to do so, is a condition for which we will not attempt to account at present.

The Penny Phone League says, "The time has come for municipal ownership." In this particular case we agree—not that we love municipal ownership, but that we hate the violation of a treaty more. Municipal, state or government ownership of any public utility is the greatest calamity, short of war, that could befall a service-demanding people. But the Chicago independent has made its bed. Let it lie in it.

There are other points upon which we cannot agree with the Penny Phone League. The first and most obvious is its name. We will not quibble about the use of the half word "phone," though we never have understood why our industry should be so afflicted when the telegraph has always escaped the equivalent term of "graph."

But the implied promise of telephone calls for a cent apiece is dangerous because it is half true. A good many very large users of service are buying calls today at a cent or less. But the Penny League is an appeal to the people. Its literature is aimed particularly at the masses of the people, who buy telephone

service for themselves rather than for large corporations.

Does the League, then, intend to promise us, in exchange for our present four-party, thirty-call, dollar and a half service, a rate giving us one hundred and fifty calls a month for our dollar fifty? The line would not be usable at all; it would be worse than the old-fashioned farmers' line. Or is it the intention to give us our thirty calls for thirty cents? Manifestly, that cannot be done by any company.

Nearly all the failures in the telephone operating business—and there have been some—can be ascribed directly to rates that were altogether too low. Even today there are hundreds of telephone companies whose rates are so inadequate that they must be raised if the companies are to continue serving the public.

Figures compiled by Telephone Expert Hall of the Michigan Railroad Commission show that out of the 315 companies in the state furnishing telephone service only 48 say they have made money. The commission says that of the 48 but few really made money, for only two or three of them make any charge for depreciation.

There are altogether too many cheap telephones now. Instead of a penny telephone league we need an organization to teach the people how to use the telephone as they have it without abusing it, and to show them that it is impossible to get something for nothing, even in telephone service.

MILITARY TELEPHONES

ELSEWHERE in this number we have attempted to give a brief description of the methods of using electrical communication on the battlefield. A dispatch to the Chicago *Tribune* from one of its war correspondents, James O'Donnell Bennett, dated September 13, at Aix-la-Chapelle, Germany, gives an interesting commentary on the resourcefulness of modern warfare, especially in the provision for uninterrupted communication:

> Looking out of the windows of a German military train when it stopped at Charleroi one morning last week I saw a German soldier bending over a flower bed in the grounds of the railway station. He seemed to be attentively examining the flowers. As he knelt there he frequently moved his hands gently among the blossoms as if he were caressing them.
>
> "See," I said to one of my companions, "there is that beautiful German love of flowers again. With the ruins of whole streets of this town still smoking this private soldier finds time to admire a flower bed that has escaped destruction."
>
> We grew quite sentimental about the matter.
>
> Suddenly the man rose from his knees and with him there came from the flower bed a telephone receiver and two or three yards of telephone wire. Straightening himself, he put the receiver to his ear and spoke rapidly. We could hear some of the words. They appeared to be a repetition or vertification of certain orders.
>
> The flower bed and the soldier were on the left of the train.
>
> On the right, and at a greater distance, you saw two parallel streets of unroofed houses. From their cellars and shattered floors clouds of smoke rose lazily into the sunshine. As the train was pulling out with its burden of silent German wounded, of disconsolate French and English prisoners, and of fretted correspondents who had been suavely assured that they were "guests" of the German army, the soldier ceased speaking and deftly replaced the telephone receiver and the wire among the flowers.
>
> The German system was working.

The army telephone has become an important agent. It must be instantly available, always in working order, and yet concealed from all but those who have official use for it. Doubtless Mr. Bennett's flower bed was but one of many strange and unconventional but effective caches for the stations of a comprehensive telephone network. Such is modern military procedure.

TELEPHONE PIONEERS' FOURTH MEETING

The fourth annual meeting of the Telephone Pioneers of America will be held in Richmond, Virginia, on October 29 and 30, 1914, with headquarters at the Jefferson hotel.

On the 29th, the morning session will be occupied by registration and the business meeting, and in the afternoon papers of interest to all the membership will be presented. In the evening, the annual banquet will be held in the Jefferson hotel.

On the 30th, a special steamer will leave Richmond at 9 a. m. for a day's trip on the historic James river, reaching Old Point Comfort for dinner at the Chamberlain hotel. At 7 p. m., the trip will be continued by night steamer to Washington, where the meeting will disband.

The American Telephone and Telegraph Company has invited members of the association, their wives or immediate members of their families accompanying them to be its guests at the banquet at the Jefferson hotel on the evening of the 29th; upon the day trip on the James river; at the dinner at Old Point Comfort, and on the night trip to Washington.

It is important that members intending to attend the Richmond meeting should advise the secretary definitely, and not later than October 10, stating when they will arrive, by whom accompanied, and in what events they will participate.

EFFECT OF WAR ON BUSINESS

The effect of war and business depression upon the Bell telephone system has been decidedly "spotty." The long distance end of the business was making big gains in the early part of 1914. Increases were running 10 to 12 per cent. The effect of prevailing conditions has been to eleminate this growth, so that long distance traffic for the past month has been of practically identical volume with a year ago. Construction outlays are naturally being slowed down and the last quarter of 1914 will see the construction program cut 25 per cent at least from the early estimates of the year.

Statement of the ownership, management, etc., of TELEPHONE ENGINEER, published monthly, at Chicago, Ill., required by the Act of August 24, 1912.

NOTE—This statement is to be made in duplicate, both copies to be delivered by the publisher to the postmaster, who will send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the post office.

NAME OF	POST-OFFICE ADDRESS
Editor, PAUL H. WOODRUFF	7025 Yale Ave., Chicago, Ill.
Managing Editor and Business Manager, ED J. MOCK,	6549 Harvard Ave., Chicago, Ill.
Publisher, ELECTRICITY MAGAZINE CORPORATION,	1457-1460 Monadnock Bldg., Chicago, Ill.

OWNERS: (If a corporation, give names and addresses of stockholders holding 1 per cent or more of the total amount of stock).

ED J. MOCK,	6549 Harvard Ave., Chicago, Ill.
B. C. SAMMONS,	Blue Island, Ill.
JOHN CROCKER,	Maroa, Ill.

Known bondholders, mortgagees, and other security holders, holding 1 per cent or more of total amount of bonds, mortgages, or other securities:

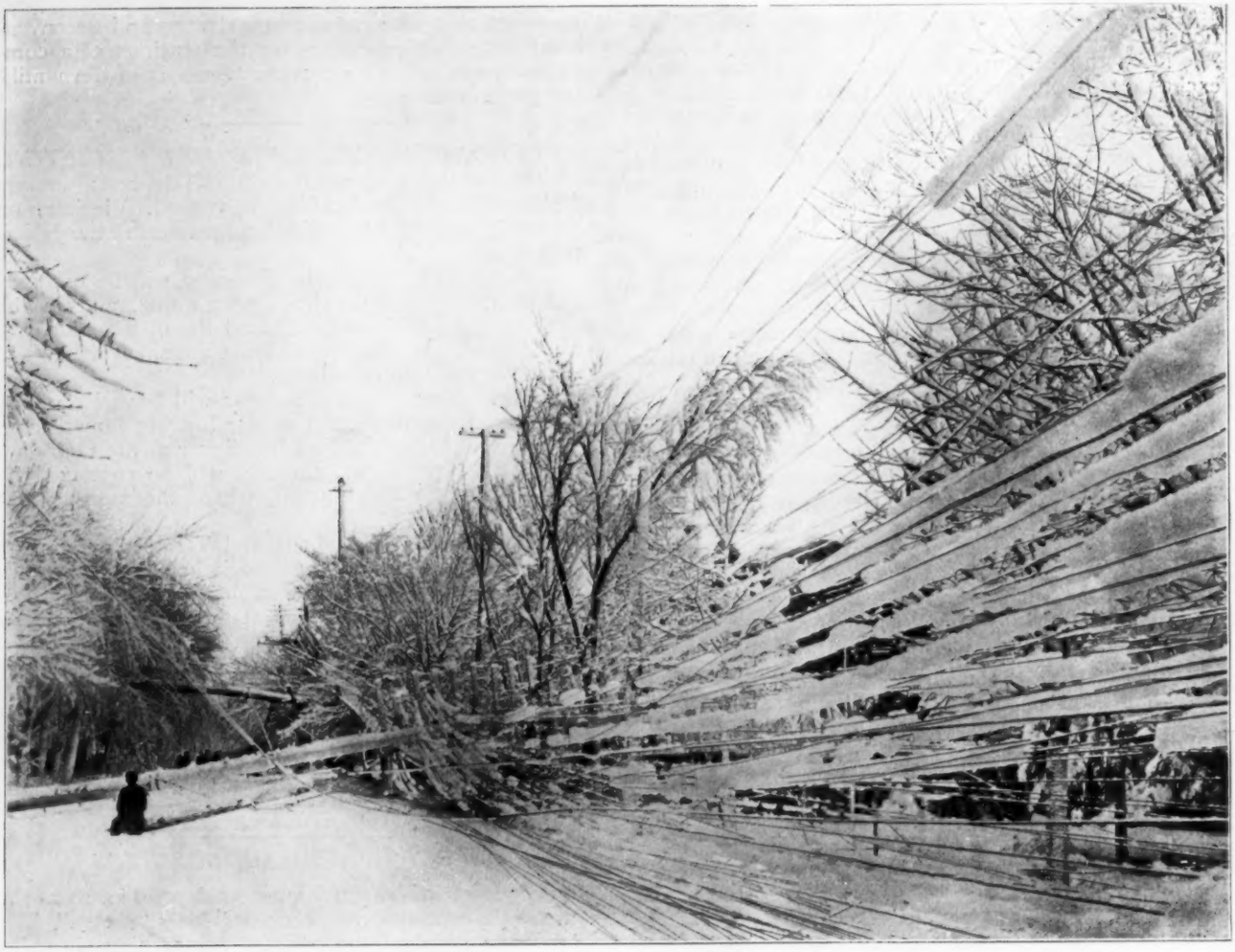
There are no bonds, mortgages or other securities outstanding against TELEPHONE ENGINEER.

ED J. MOCK, *Business Manager.*

Sworn to and subscribed before me this seventeenth day of September, 1914.

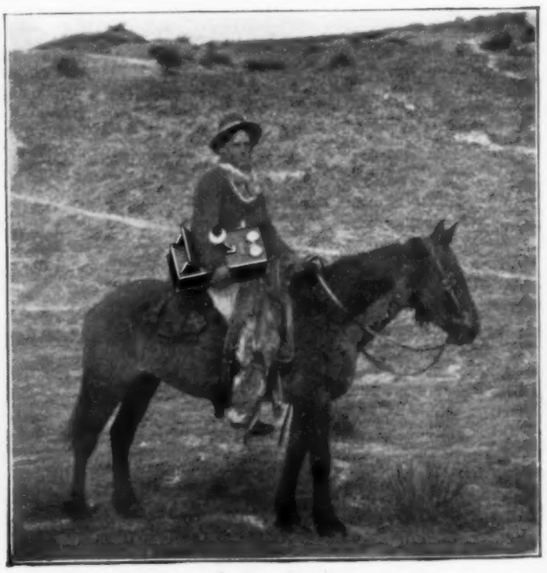
(Seal) LEONA J. EKSTROM.

My commission expires Aug. 17, 1918.



Just Another View of Sleet Storm Damage to Telephone Lines—an Expense that Only Underground Construction Will Eliminate.

Only a Nebraska Sod House—but It Has a Telephone.

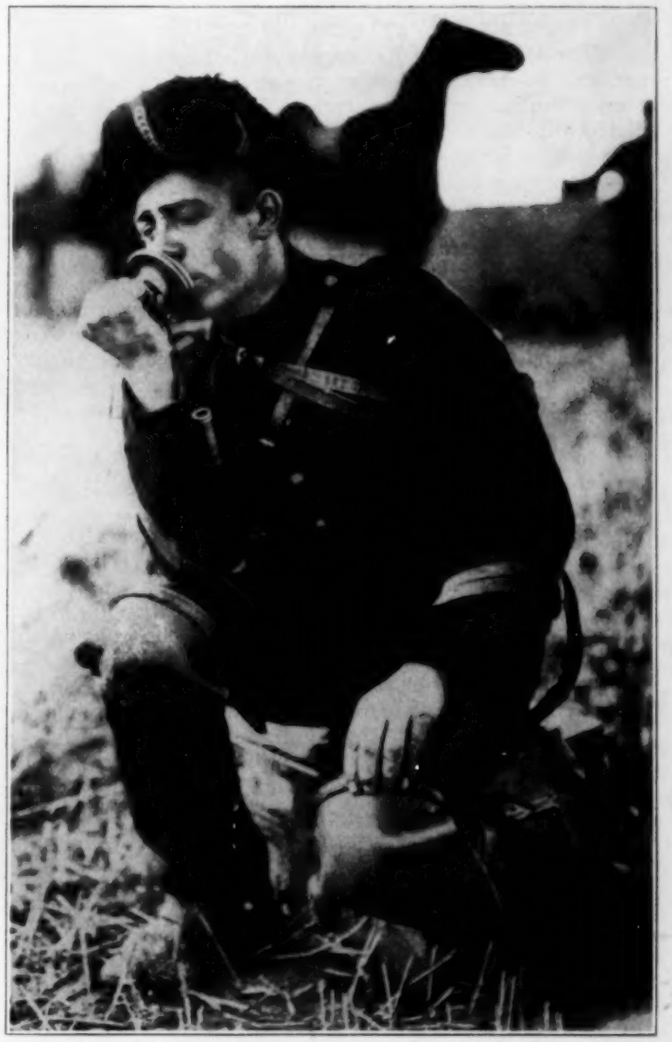


A Cowboy Installer with a Telephone.

Incidents Along the System of the Maxwell-Brady Telephone Company of Brady Island, Nebraska. From the Western Electric News.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

The Wireless Telephone in Motion Pictures. J. P. McCarty, an Actor for the Reliance-Mutual Film Company, is the Inventor of the Particular System Used in These Pictures. The Story Tells How a Crooked Financier Tries to Steal the Wireless Invention and is Finally Electrocuted by the Powerful Electric Current of the Apparatus. The Equipment Shown is Actual Working Apparatus. The Members of the Company Were Instructed in the Use of the System by the Actor-Inventor. The Title of the Picture is "The Wireless Voice," and Its First Showing is Scheduled for October 3.



A Belgian Officer Reporting to Headquarters by Field Telephone, at Landon, Belgium, Where the Germans Failed to Take the Embankment. This Photograph was Taken During One of the First Actions of the Present War. Copyright by the International News Service.

Photographs Taken by Gerald Jacques of Antwerp, Belgium, Showing Belgian Soldiers Quartered in the Antwerp Factory of the Western Electric Company, Whence Vice-President Swope of the Company Has Just Returned. This Plant Was Closed and Then Reopened to Relieve the Want and Distress of the Employes. The Pictures Were Taken July 31. The Government Had Requisitioned Space to House Five Hundred Troops in the Factory Buildings. "Trying to Do Business and Hold Conferences Constantly Interrupted by the Blasts of Trumpets or the Entrance of Officers Was Difficult Indeed," Says Mr. Swope in the Western Electric News.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Indiana Independents Convene

The eighth annual convention of the Indiana Independent Telephone Association was held at the Claypool Hotel, Indianapolis, September 16 and 17. As predicted, this was the biggest convention the association has ever held, more than two hundred and fifty telephone men being registered. There are about 437 independent telephone companies in Indiana, many of which are extensive enterprises, while others are smaller concerns doing business with the farming communities. Practically all of these companies were represented at the convention.

Thomas Duncan, chairman of the Indiana Public Service Commission, scheduled to talk at the sessions of the association, sent Charles J. Murphy, a member of the commission, as a substitute. Mr. Murphy delivered an interesting short talk to the telephone association delegates.

F. B. McKinnon, secretary of the National Independent Telephone Association, talked on the relation of federal authorities to telephone interests.

The convention closed with the election of officers, unfinished business, committee reports and appeals and references. Those elected as officers are as follows: Walter Uhl, Logansport, president; F. E. Bohn, Fort Wayne, secretary; H. M. Hosea, Indianapolis, treasurer. Just before adjournment, N. G. Hunter, retiring president, announced the appointment of F. E. Bohn of Fort Wayne, William Fortune of Indianapolis, and H. F. Farwell of Terre Haute, as a committee to look after telephone interests before the commission named recently by Governor Ralston to investigate the hours of employment of women operators.

Telephone Censoring a Problem

In time of war government officials have considerable trouble in censoring the different systems of communication. The telegraph and wireless would be an easy proposition compared with the task of censoring telephone conversations. In order to obtain a complete control over the telephone it would be necessary to put a stenographer on every line, which, of course, would be nearly impossible. However, the long distance conversations would be more easily censored, as the business in that line is not so heavy.

The European telephone system is nothing to be compared with that in the United States, and the different governments now involved in the great war have little trouble in their censorship work. The tremendous amount of business done by American telephone companies would make the censoring of conversations almost impossible unless the majority of the lines were entirely cut out.

Secret Wireless Station in Rome

According to a correspondent at Milan Mr. Marconi, when last in Rome, discovered, by means of an improved direction finder which he has devised, that a high-power wireless station had been secretly installed in the headquarters of a foreign religious order in Rome. The apparatus was capable of communicating with long-distance stations in other countries. The Italian government raided the premises and destroyed the installation.

Effect of War on Mica Market

J. Meirowsky, of Meirowsky Brothers, Jersey City, declares that, although it is too early to say what the definite effect of the European war will be on the mica market, there are some results that can be clearly seen at the present time. It is rumored, he states, that certain mines in India will be closed for some months to come, and it is even reported that all mines in India will be ordered shut down by the English government because of the large amounts of explosives used. In addition to the curtailment of production, the shipping facilities have also been affected, and so it is natural to expect a rise in prices. On the other hand, Mr. Meirowsky remarks, the consumption of mica has also been reduced. To Germany, Austria and France, where large amounts of mica are used for manufacturing purposes, shipments have practically ceased. The conclusion seems to be that there may be an advance in prices, especially on block mica. Mr. Meirowsky has also heard that mica has been declared contraband of war by England.

Louisville Sues for $5,000

Acting under instructions of the city council of Louisville, Ky., Jonas G. Howard, city attorney, has filed suit in the Clark circuit court, against the Jeffersonville Home Telephone Company and the National Surety Company of New York, demanding judgment for $5,000 damages on account of the failure of the first-named corporation to carry out its contract with the city to build a telephone system.

The complaint recites that on April 29, 1913, the city council passed an ordinance granting a franchise to the Jeffersonville Home Telephone Company to build and maintain a telephone exchange and system in the city; that the grantee was required to furnish bond of $5,000 within sixty days for the performance of its side of the contract under which it was required to have such exchange operating within one year. It is recited such bond was furnished with the other defendant surety on June 25, 1913. The contract was accepted for the telephone company by V. E. Furnas, president, and J. F. Beaucond, secretary. Later another company was organized and took over the rights and John D. Driscoll of Jeffersonville, signed the bond as president thereof and J. Morton Morris as representing the surety company.

Damages are demanded on the ground that the company erected poles which defaced the street and were in some measure a hindrance to traffic but did not complete the work. It is further asserted that the city was deprived of competitive rates with the Cumberland Telephone Company, which were promised in the ordinance, the scale being lower than that of the Cumberland.

Extra Service and Few Men in England

During the first week of the war crisis, the resources of the English postoffice engineering staff were taxed to the utmost. Innumerable extra telephone services were demanded by the various authorities concerned, and were put in with a promptitude which reflects the greatest credit upon the department, in spite of the withdrawal of a large number of employes demanded for war service. The pressure upon both telephone and telegraph services has naturally been very heavy, but by working overtime and cheerfully taking extra duties, the staff have coped successfully with the rush of work. The telephone operators have given a good account of themselves, the efficiency of the service given having been highly appreciated. It was rumored also that, although the English government had declared its intention to maintain business at full volume, the telephone contracts of the postoffice had been canceled or withdrawn.

How The "Telescribe" Works

A Description of Edison's Latest Invention Combining the Telephone and the Phonograph

IT is within the memory of many of us that Bell stirred the world at the Centennial Exposition in 1876 with his speaking telephone, and only two years later that Edison produced the phonograph—a machine that talked.

Probably if it had not been for the work Edison did in the invention of the telephone transmitter shortly after 1875, the phonograph would not have come so soon, for it was Edison's experience with the diaphragm action in the telephone that suggested the recording possibilities of a diaphragm vibrating on tin foil.

This close connection of experiments on the telephone and the phonograph shows itself in the first article Edison himself wrote on the latter invention, which appeared in the *North American Review* in 1878.

With prophetic insight into the future application of the phonograph he enumerated ten uses it would have. Present-day utilities fulfill all of these forecasts, except the tenth use, expressed by Edison at that time as follows:

> Lastly, and in quite another direction, the phonograph will *perfect the telephone*. That useful invention is now restricted in its field of operation by reason of the fact that it is a means of communication which leaves no record of its transactions, thus restricting its use to simple conversational chit-chat, and such unimportant details of business as are not considered of sufficient importance to record. Were this different and our telephone conversation automatically recorded, we should find the reverse of the present status of the telephone. It would be expressly resorted to as a means of perfect record. In writing our agreements we incorporate in the writing the summing up of our understanding—using entirely new and different phraseology from that which we used to express our understanding of the transaction in its discussion and not infrequently thus begetting perfectly innocent causes of misunderstanding. Now, if the telephone, with the phonograph to record its sayings were used in the preliminary discussion, we would not only have the full and correct text, but every word of the whole matter capable of throwing light upon the subject. Thus it would seem clear that the men would find it more advantageous to actually separate a half mile or so in order to discuss important business matters, than to discuss them verbally and then make an awkward attempt to clothe their understanding in a new language. The logic which applies to transactions between two individuals in the same office, applies with greater force to two at a distance who must discuss the matter between them by the telephone or mail. And this latter case, in turn, is reinforced by demands of an economy of time and money at every mile of increase in distance between them.

Thomas A. Edison in His Library Using the Telescribe.

The telescribe is Edison's last accomplishment, and completes his predictions, made in '78, for this use of the phonograph. It is of some satisfaction, and certainly very fitting, that this combination of telephone and phonograph has been left for Edison to accomplish. That it has been no easy matter is best appreciated by the reflection that no one has done it before, although it must be evident how valuable its use promises to be.

We could not live without the telephone today. That is almost literally true—at least, in business. Our national characteristics make for speed and initiative, which call for just the kind of action the telephone typifies.

In these dazzling days it is idle to predict. The inventor has everywhere put the prophet out of business. Fact has outrun fancy. Who could have foreseen what the telephone bells have done to ring out the old ways and ring in the new; to ring out delay and isolation and to ring in the efficiency and the friendliness of a truly united people?

With the vast importance of the telephone, it is surprising that no recording devices like the Edison telescribe have been heretofore introduced. Two natural explanations suggest themselves: First, the telephone companies have had their hands full with the rapid development of the telephone industry itself; second, to effect the proper combination one must be master of both arts—telephony and phonography—a position which Edison and his assistants happily represent.

Certain it is that business will be more efficiently conducted by the introduction of the telescribe. We copy letters and refer to them—the recipient knows his letter is copied and in the sender's file as a matter of record. We sign the letters and place the statements in our correspondent's hands, expecting to have them referred to as evidence. This is also true to some extent in telegraphing.

But in telephoning, which is the quickest means of communication—and so necessary and popular as well—we have no records for reference; no feeling of security that attends the actual possession of a signed communi-

cation, or the carbon copy of a letter we have mailed to another.

The Edison telescribe comprises an Edison dictating machine, which is especially equipped with the telephone recording appliances.

It is interesting to note that the telescribe comes at a time when millions of letters a year are dictated and transcribed from the Edison dictating machine. This situation removes the difficulty of the average business office understanding the phonographic side, which guarantees the telescribe's success. A glance at the telescribe reveals a complete device for telephone connections with the ordinary desk set. The dictating machine is equipped with a micro-recorder, which swivels into place over the wax cylinder, and is wired up with the telescribe on the user's desk. In short, the telescribe is a complete telephone extension run with its own small batteries, concealed in the casing.

A telephone message is telescribed in the following manner: The receiver of the regular desk telephone is removed from the hook and placed in the socket of the telescribe. In this way the acoustic connection to the dictating machine is made without danger of criticism from the telephone company, as the instrument is neither mechanically nor electrically connected to its lines. The user then takes up a small receiver, which is part of the telescribe, and gives his call to the exchange, while starting and stopping the dictating machine by means of two small buttons on the telescribe in order to record the conversation between pauses or delays, and avoiding any waste of running the wax cylinder meanwhile.

In this way, *both sides* of the telephone conversation are recorded, including all the evidence of the central operator's voice in making the connection. The dictating machine becomes, in reality, an "eavesdropper" on the telephone line.

There are many telephone subscribers in every locality who have monthly toll bills of hundreds of dollars, evidencing the practice of conducting an important part of their business by "conversations." Brokers, in many instances, do buying and selling by telephone from both local and outlying territory; advertising agents secure the approval of their clients at distant points by reading late copy on the telephone; purchasing agents place orders and secure promises and prices of importance as a daily occurrence through the telephone. But the special applications of the telescribe will not be as important as the ordinary uses which every large organization finds for recording wire conversations in the course of its ordinary day's work.

The telescribe will place the use of the telephone in a more serious light in business. After a conversation, the dictator will turn to his dictating machine and confirm his message in the usual manner covering the general understanding, while he will mark his letter: "Telescribed on the Edison dictating machine." To the person receiving this confirmation, the question of its correctness will be unquestioned, and give that feeling of business security to both sides which is now missing, and in some cases may be even depended upon if denial of telephone understanding is expedient.

The wax record, containing the telescript and the dictated confirmation, may be retained indefinitely for reference, but future acknowledgments and circumstances reduce the time for holding the records to only a few days in most instances.

Under-Water Talk Between Forts

The United States Signal Corps of the regular army has begun the work of laying submarine cable in Puget Sound (state of Washington) in order to establish a reliable means of keeping open lines of communication between the various fortifications that guard the approach to Seattle. Three forts are to be connected so that there will be three legs to the submarine telephone system.

Seventeen miles of 20-pair No. 19 B. & S. gauge paper insulated submarine telephone cable will be required for this work. The Western Electric Company with whom the government placed the order to manufacture the cable has shipped it in seventeen lengths of one mile each, one mile of cable to a reel and two reels to a flat car.

The cable when laid will form a vital part of a telephone system that will be of great value either in war-time or in manoeuvres by making it possible for the commanding officer to be in constant touch with all the fortifications and keep them working in harmony with each other. Furthermore, none of the wiring will be exposed to the fire of an enemy, thus insuring the integrity of the lines at all times.

The Signal Corps has also recently completed the laying of a submarine cable to connect the fortifications in New York harbor with those at Sandy Hook. This cable is eighteen miles long and consists of 10-pairs of No. 19 B. & S. gauge copper conductor.

Carbondale Opens New Exchange

The employes of the Carbondale district of the Consolidated Telephone Company and district superintendents between Carbondale, Pa., and Reading enjoyed a delightful collation in the grill room at the Hotel American, recently. The banquet marked the formal opening of the new exchange and the field force, from the general manager down to the linemen and switchboard operators, was as an organization at the festive board to exchange views whereby the most efficient service possible may be obtained. Before arriving at the hotel, the Consolidated employes received visitors at the local exchange and explained the interesting and complex workings of the new system which was installed a few months ago.

The company's auditor, J. R. Lynch, talked briefly on the financial end of the institution, "The Bank Balance and the Pay Roll," being the toast assigned to him. L. H. Baker, the traffic manager, gave a very interesting talk on "Consolidated Service," C. J. Larsen, engineer had the subject "The Carbondale Plant."

The Ceaseless Flow

A ring at the telephone drew the office boy.

"Lady to talk to you, sir," he said to the senior partner.

The senior partner took up the receiver and stood at the telephone for several minutes.

Then he laid the receiver down and went back to his desk.

Twenty minutes later he raised the receiver, said a few words and presently hung it up.

Then he turned to his partner.

"It was my wife," he explained. "She was still talking and hadn't missed me."

Army Lines of Communication

How Electrical Methods of Intelligence Transmission Have Changed Warfare

BY PAUL H. WOODRUFF

IT has been whimsically suggested that if Napoleon were suddenly to assume charge of any of the armies now on Europe's battleground, he would be hopelessly confused. In the last century the school of strategy has changed. The war offices today manage to conceal their reports and their great men, but that is as far as the secrecy extends. From each other the warring armies can scarcely hide a single tactic—if there be such a thing. The day of mystery in warfare has passed.

Swift automobiles transport officers and men and their necessities a day's march in an hour. But above the advancing lines hover the enemy's aerial scouts, reporting back to headquarters every significant movement. Rapid-firing guns trained to throw their missiles skyward with deadly accuracy may bring down the spying human birds, but already their reports have been "wirelessed" back to their officers, and there is still no secret.

Small arms and heavy ordnance carry farther today and find their mark more surely. The scouting parties that go out, just as of old, may have to cover more ground, but as they go they unreel behind them a thin, long wire, and their messages go back instantly to the waiting camp. They may be cut off by the enemy, but they have reported—it is too late. Modern methods of entrenchment, neutral-tinted uniforms, all the new machinery of concealment avail little against the still newer means of communication.

It devolves particularly on the signal corps to provide for this speedy transmission, and this is accomplished by the use of electric communication in the field. The telegraph and telephone have become so much a part of our daily life in business and personal relations, that we scarcely realize our reliance upon the service rendered by the elaborate system of wires, apparatus and well-trained personnel. To re-establish as far as possible such service under field conditions is one of the objects of the signal corps. It is obvious that, under such conditions, an entirely new line of equipment is required, and that men must be specially trained to its use.

The work to be performed may be considered as divided into three classes: First, the maintenance and operation of such lines from the capital of the nation to the headquarters of the army in the field; second, the construction, maintenance and operation of radio-telegraph stations and semi-permanent telephone and telegraph lines from the headquarters of the army in the field forward to the various divisions at the front, also the provision of the necessary camp telephone and telegraph lines within the army; third, the establishment of the temporary lines in the combat zone included within the active field operations of the divisions, consisting largely of insulated wires laid on the ground and the radio-telegraphic and visual signal communication for tactical purposes.

Most of the equipment required in the first class named is taken over from the commercial telegraph systems, which under stress of war conditions, at least in part, have to be manned and operated in the interest of the nation. A military organization and control is substituted for the civil one, and the ordinary telegraph apparatus, either land lines, cable, or radio, used. Signal corps soldiers in this zone of operations quickly recruited and organized from the operators and linemen of the country require but little preliminary military training.

In communication from field headquarters to the front, the work performed is in territory where recent military operations make it necessary to organize and equip for conditions quite unlike those for electrical communication in peace times. The wire lines must, in general, be hastily built with light wire supported on temporary small poles called "lance poles," and the radio apparatus must be of a portable variety. Telegraph apparatus employed on high resistance and poorly insulated wire is of the special type which has been developed, requiring only a few dry cells for operating over long and difficult lines. A very compact and portable form of camp telephone has been devised to meet the requirements of rough field service; also a folding type of telephone switchboard of great ruggedness and simplicity for use in field headquarters and camps. All this equipment of light poles, wire, and instruments has been divided up into proper proportions for the different requirements, and special wagons have been

provided to insure its transportation and accompany the field army or divisional headquarters. The officers and men designated for this work are organized into telegraph companies and telegraph battalions. The sections of these companies are each equipped and drilled to install a well-defined part of the system. The telegraph section can establish and operate a certain amount of line with the stations thereon. The telephone section is equipped to put in a camp central station with the wire and telephones for a large camp. The officers and men of the telegraph battalions must be well trained, not only in their technical, but also in the soldierly duties pertaining to active field service. As at present authorized, a telegraph battalion in our service consists of two companies, each composed of six sections, three of the sections being equipped for telegraph and three for telephone installation. The company consists of four officers and one hundred and thirty-nine men. A telegraph section requires two wagons, and a telephone section three, for its technical equipment.

To the intelligence service troops serving in the zone in front of the division is assigned the task of maintaining lines of information during action, hence these have been called "tactical" or "combat" lines. The wire lines consist of insulated wire laid on the ground, for it is only such lines that can be laid and used to follow the rapidly changing phases of the conflict. As each infantry brigade and the artillery goes into action, it is followed by a reel cart laying wire from division headquarters. The strong flexible wire employed is an insulated one of stranded steel and copper, and can be laid from the cart at a gallop, and almost as quickly reeled up on the drum by means of a chain and sprocket gear. For emergency use and over short distances, a much lighter wire can be laid from a hand reel. These wires being of high resistance, and frequently leaky, a special instrument known as the buzzer has been developed for operating over them. This remarkable instrument contains in a metal-lined leather case a small dry battery, induction coil and interrupter, key, telephone receiver, and telephone transmitter. When the key is pressed, the interrupter operates, and sends out from the coil an alternating current, which traversing the line and distant telephone receiver gives out a sharp note. The intermittent current produced by the sending key becomes the dots and dashes of the Morse alphabet. By pressing a button on the side of the transmitter, the instrument at once is transformed into a field telephone. Owing to the sensitiveness of the telephone receiver, the intense buzzing sounds sent out as Morse telegraph signals are audible over an incredibly bad line. For example, it has been worked successfully over twenty miles of bare wire laid on the ground in rainy weather. It can be made to work over a wire which has been broken, and the ends left lying fifty feet apart on damp ground. The whole apparatus is reduced to practically the size of a field-glass case, and weighs about five pounds, rendering it readily portable by means of a strap over the shoulder. It is the ideal instrument for field telegraphy or telephony over the combat lines laid by the reel cart.

Besides the need for communicating from division headquarters to the infantry and artillery brigades, the divisional cavalry requires means for reporting back what its patrols and scouting parties ascertain. It would be inadvisable to hamper the divisional cavalry's movements with wire connections of any kind, so the light field radio pack sets have been devised to accompany the swiftly moving cavalry. In addition, near division headquarters, a more powerful radio set in a special pintle-type wagon is always ready to set up and communicate with the cavalry pack set or others. The radio pack set consists of three main parts—the operating chest, the hand-rotated alternating generator, and a sectional mast with the aerial wires, or antenna, attachment. The whole outfit, with tent and accessories, makes moderate loads for and is carried on three mules. With easily manipulated strap attachments, the set can be made ready for use by the mounted section in one minute from the time a halt is ordered. This includes unpacking the operating chest, and getting the handpower generator connected and sending started. The little generator develops about 0.3 kilowatt, and the range of operation with another similar pack set is about twenty-five miles under ordinary conditions. The wagon type of radio apparatus derives its power from a gasoline engine, the alternator develops about two and one half kilowatts, and a sectional mast eighty feet high is employed. This can be put up and the set operated in fifteen minutes. The range under ordinary conditions is about one hundred and fifty miles.

Electrical communication, in war as in peace, is the great unifier. By its aid all the various parts which constitute a fighting army are bound permanently together. Detachments are no longer detached; parties go out and still, by its miracle, remain in camp. It has made warfare at once easier and more difficult; simpler and more complex. Let us pray that it may be even more important in the negotiations for peace than it is in conducting the business of war.

International Electrical Congress

The International Electrical Congress will hold its sessions at the Panama-Pacific Exposition during the week beginning September 6, 1915.

The papers, with discussions relating to them, will be published in thirteen volumes which, without entering here into minutiae, will deal with the following subjects: Volume 1—Generation, transmission and distribution; 2—Apparatus design; 3—Electric traction and transportation; 4—Electric power for industrial and domestic use; 5—Lighting and illumination; 6—Protective devices, transients; 7—Electro-chemistry and electro metallurgy; 8—Telegraphy and telephony; 9—Electrical instruments and electrical measurements; 10—Central station economics; 11—Electrophysics; 12—Miscellaneous; 13—General congress proceedings.

These thirteen volumes will constitute what a prominent electrical engineer terms "The Electrician's Bible"; and the term is fitting enough, for in them will be written the gospel of electrical truth, as it is known and understood today; a gospel written by experts who have participated in the creation of an existing order of facts that would have been regarded as miraculous by the men of a half-century ago.

The congresses have been arranged so that engineers who have but limited time at their disposal may secure the benefit of several in which they will be interested. The International Electrotechnical Commission, which is the mother body in electrical affairs, meets during the week beginning September 6, 1915; the International Electrical Congress during the week beginning September 13; International Engineering Congress in week beginning September 20, and International Gas Congress in week beginning September 27. The deliberations of the four congresses will be covered by twenty-seven days, and an engineer will have to be in a hurry if he cannot remain for all.

Investigation of Inductive Interference

California Joint Committee Report as Presented Before the A. I. E. E..

THIS report presents briefly an account of the formation of the Joint Committee on Inductive Interference, its activities and results accomplished to date, and recommendations for such rulings by the Railroad Commission of the State of California as the committee believes are justified at this time; together with a technical discussion in explanation of the results and recommendations.

The formation of the Joint Committee on Inductive Interference was the outgrowth of certain differences involving power, communication and railroad interests which were brought to the attention of the Railroad Commission of California. As an alternative to contesting the issue at that time it was agreed by the power and communication companies, with the approval of the commission, that a joint investigation should be made to obtain certain information essential to a proper solution of the difficulties. The commission desired that the matter be thoroughly investigated before passing upon the general principles involved in these difficulties. To this end a general conference was called to select representatives to form a "Joint Committee" empowered to conduct tests, experiments and investigations, the results of which would serve as a basis of recommendation for rules and regulations, to be issued by the commission, tending to minimize inductive interference and physical hazard arising from parallelism of different classes of circuits. This conference was held December 16, 1912. As a result, the Joint Committee on Inductive Inteference, representing the Railroad Commission and railroad power, and communication interests of the state, was organized and authorized by the Railroad Commission of California to conduct the desired investigation.

The organization and personnel of the Joint Committee on Inductive Interference were approved by the Railroad Commission on January 6, 1913, and the committee thereupon proceeded with the necessary tests and investigations.

For the more efficient conduct of its work the Joint Committee was divided into several smaller sub-committees, each assigned to certain investigations.

Early in its work the Joint Committee established a field engineering staff reporting to the Sub-committee on Tests, to conduct the necessary tests and investigations. This field staff was composed of engineers in the employ of the Pacific Telephone and Telegraph Company and the American Telephone and Telegraph Company and was later augmented by the addition of two engineers and a stenographer engaged by the Joint Committee.

Previous to the formation of this committee in December, 1912, the Pacific Telephone and Telegraph Company had started an investigation of inductive interference between the lines of the Coast Counties Gas and Electric Company and the lines of the telephone company in the neighborhood of Morganhill in Santa Clara county. This investigation was completed by the Joint Committee and its results have been considered in connection with other work carried out by the Joint Committee.

In January, 1913, the Joint Committee established its field staff at Salinas, to investigate parallels on the lines of the Sierra and San Francisco Power Company north of Salinas and on the lines of the Coast Valleys Gas and Electric Company south of Salinas, both of these power lines being parallel with lines of the Pacific Telephone and Telegraph Company, the Western Union Telegraph Company and the Southern Pacific Company's signaling system. The investigation at Salinas continued from January, 1913, until July, 1913.

The specific work undertaken at Salinas was: A determination of the magnitude and characteristics of the induction produced in the communication circuits, the factors in the power circuits causing this induction, the quantitative relationship of cause and effect, and a comparison of the effects on the parallels north of Salinas with the neutral of the power circuit alternatively grounded beyond one end of the parallel and beyond both ends of the parallel.

In July, 1913, the field headquarters were moved to Santa Cruz. At this point the committee desired to test the relative merits of various schemes of transposition for both power and telephone circuits, and to complete the investigation begun at Morganhill on the system of the Coast Counties Gas and Electric Company, which

LETTER OF TRANSMITTAL TO THE RAILROAD COMMISSION OF THE STATE OF CALIFORNIA, SAN FRANCISCO, CALIFORNIA.

The Joint Committee on Inductive Interference submits herewith a report based on its work to date, containing provisional rules which tend to improve conditions in respect to inductive interference. The investigation undertaken by the committee has not been completed but the results already obtained serve to point out a number of requirements and precautionary measures which should be complied with in future work. These have been embodied in the rules presented herewith and *it is the recommendation that these rules be made effective immediately without waiting for the completion of the investigation.*

The committee desires to explain, in respect to certain of the rules, that while the general character of their essential provisions is well understood, the information available at present is not sufficiently complete to make it possible to set definite quantitative limits and to make all the rules explicit such as they should be in order to afford the maximum reduction of inductive interference consistent with the burden imposed by the rules. In a few instances, rules have been drawn with definite limits which have been set somewhat arbitrarily, in accordance with the Committee's best judgment. Therefore, the rules are not put forth as being complete or final but must be regarded as provisional and subject to such change as the results of further investigation and experience may determine. They are, however, recommended unanimously by the committee as the best which can be formulated at this time and thus having the support of all the interests represented on the committee, it is hoped that the rules will appeal to the Commission as being reasonable and proper.

The report also outlines other experimental work, some of which is now in progress, which the committee considers essential in order that additional information may be acquired for amplifying and revising these rules to make them more definite and complete.—Respectfully submitted, Richard Sachse, A. H. Babcock, R. W. Gray, F. Emerson Hoar, J. E. Woodbridge, J. P. Jollyman, P. M. Downing, H. A. Barre, C. H. Temple, A. H. Griswold, R. W. Mastick, V. V. Stevenson, J. A. Koontz, A. L. Wilson, *Joint Committee on Inductive Interference. Honorary Members:* Howard S. Warren, James T. Shaw.

system is of a different character from that studied at Salinas. A mathematical study of transpositions in general, and particularly of those for the parallel between Santa Cruz and Watsonville, has been completed. The experimental study of these schemes of transpositions has not as yet been completed.

Owing to the peculiar nature of the experimental work and the refinements required, suitable apparatus was not easily obtainable and in many instances it was necessary to design and develop special apparatus for certain of the tests. A considerable amount of time has necessarily been spent at all points of the tests in choosing, from the almost innumerable things which could be investigated with profit, those of greatest value which could be carried out with the means at hand.

In the course of its investigations the committee has prepared a series of fifty technical reports which present and discuss in detail the various features of the work, the methods and apparatus employed and the results accomplished. These reports, which are on file at the committee headquarters in the offices of the Railroad Commission of California, are listed in Appendix V.

RESULTS ACCOMPLISHED.

The following paragraphs summarize very briefly the principal results accomplished to date. These statements of results are accompanied by brief explanatory comment upon the conclusions reached. The reasons for and explanations of these conclusions are given in more detail in the appendices to which reference is made.

1. *Interference to telephone circuits under normal operating conditions of power circuits arises almost wholly from the harmonic voltages and currents of the power system.. (See Appendix I).*

This is due chiefly to the fact that the frequencies of the harmonics generally present in the voltages and currents of power systems cover a considerable portion of the range of the voice frequencies, particularly those frequencies at which telephone instruments and the human ear are of maximum sensibility. Extraneous currents of freqencies approaching the average voice frequency have a more injurious effect upon telephone conversation than currents of lower frequencies.

2. *The effect of induction of the fundamental frequency on telephone circuits is comparatively unimportant unless it is of magnitude sufficient to constitute a physical hazard. (See Appendix I.)*

This is due to the fact that the fundamental approaches the lower limit of audible frequencies, at which the telephone and the human ear are not efficiently responsive.

3. *Interference to telegraph and other signaling circuits is due principally to the fundamental and lower harmonics. (See Appendix I.)*

Telegraph receiving instruments are relatively insensitive, as compared with the telephone, to the higher harmonics, but are sensitive to disturbances of lower frequencies, such as the fundamental and lower harmonics which more nearly approach the normal operating frequency of such circuits.

4. *The power circuit currents and voltages may be divided into two factors: balance and residual, of which, for equal magnitudes, the latter in general produce the greater inductive interference. (See Appendix II.)*

Residual currents and voltages act inductively in a similar manner to single-phase currents and voltages acting in a circuit composed of the line conductors in parallel with earth return, which is a condition favorable to large induction. Moreover, such a circuit which includes the earth as one side cannot be transposed. Transpositions in the power circuit cannot reduce the inductive effect of residuals except as they reduce the magnitudes of the residuals themselves, which they do in some cases. The inductive interference arising from such currents and voltages can be reduced only in the case of metallic circuits such as telephone circuits, by transposing these circuits. It is therefore important that the telephone circuits be transposed at frequent intervals throughout parallels and carefully balanced throughout their entire length, and that the residual currents and voltages be kept sufficiently small to give negligible induction in telephone circuits so arranged.

5. *Inductive interference to communication circuits, arising from the balanced voltages and currents, can in a large measure be prevented by means of an adequate system of transpositions applied to both power and communication circuits (assuming the latter are metallic) and located with due regard to each other.*

This is accomplished partly by creating mutually neutralizing inductive effects in neighboring lengths of each side of the communication circuit or circuits by transposing the power circuit, and partly by equalizing the inductive effects on the two sides of the communication circuit or circuits by exposing each side equally to the influence of the power circuit by transposing the communication circuit.

6. *Abnormal conditions and at times switching operations produce transient disturbances of a very severe character.*

This is due to the fact that abnormal conditions almost invariably give rise to residuals of large magnitude, often including high harmonics. Abnormal occurrences incident to electrical power transmission do not give warning of their occurrence, and since they cannot be produced artificially on transmission systems without subjecting the apparatus to great risk or danger, it has been deemed unwise to attempt any experimental tests of these effects. This conclusion is therefore drawn from general experience and data of actual occurrences collected by the committee.

RULES RECOMMENDED BY THE COMMITTEE.

The following are the rules which the committee, as the result of its study to date, recommends be issued at this time to govern the future construction and operation of power and communication circuits which are or are proposed to be so located as to create a parallel as hereinafter defined.

Definitions.

- a. Power Circuit.
- b. Communication Circuit
- c. Telephone Circuit.
- d. Line.
- e. Parallel or Parallelism.
- f. Residual Current.
- g. Residual Voltage.
- h. Transposition.

I. Avoidance of Parallelism.

II. Conditions under which Parallelism will be Permitted.

- a. Minimum Horizontal Separation.
- b. Balance of Power System.
- c. Limitation of Residual Currents and Voltages.
- d. Transpositions Inside Limits of Parallel.
- e. Transpositions Outside Limits of Parallel.
- f. Uniformity of Parallel.
- g. Transformer Connections.
- h. Switch Equipment.
- i. Switching.
- j. Use of Air Switches.
- k. Abnormal Conditions.
- l. Devices for Indicating Abnormal Conditions on Systems Isolated from Ground.

m. Procedure under Abnormal Conditions.
n. Ammeters in Neutral Ground Connections.
o. Charging Electrolytic Lightning Arresters.
p. Wave Form of Rotating Machines.
q. Exciting Current of Transformers.

III. Provisions Applying to Existing Parallels.
IV. Waiver of Conditoins by Communication Company.
V. Parallelism with Alternating-Current Railways.

Definitions.—The following definitions are given of certain technical terms employed herein:

a. *Power Circuit.* The term "power circuit" includes any overhead constant-potential alternating-current power transmission or distribution circuit or electrically connected network which has a voltage of five thousand volts or more between any two conductors or of three thousand volts or more between any conductor and ground.

b. *Communication Circuit.* The term "communication circuit" includes any overhead, open wire telephone, telegraph, or signaling circuit which is used in the service of the public.

c. *Telephone Circuit.* The term "telephone circuit" includes any inter-exchange metallic telephone circuit, and therefore excludes subscriber's circuits. This term also includes any metallic telephone circuit operated by any railroad or other company for dispatching purposes or for public use between separate communities.

d. *Line.* The term "line" means any circuit or aggregation of circuits carried on poles or towers.

e. *Parallel or Parallelism.* The terms "parallel" or "parallelism" refer to cases where a power line and a communication line follow substantially the same course, or are otherwise in proximity for a sufficient distance, so that the power circuit is liable to create inductive interference in the communication circuits.

f. *Residual Current.* The term "residual current" denotes the vector sum of the currents in the several conductors of a power circuit.

g. *Residual Voltage.* The term "residual voltage" denotes the vector sum of the voltage to ground of the several conductors of a power circuit.

h. *Transposition.* The term "transposition" denotes the interchange of position of the several conductors of a circuit.

I. Avoidance of Parallelism.

Every reasonable effort shall be made to avoid new parallelism. The party proposing to build a new communication or power line, which will create a parallel, or generally to reconstruct an existing line involved in a parallel, shall give due notice (at least thirty days wherever possible) of its intention to the other party, including detailed information as to the location and character of the proposed line. If a plan can be devised and agreed upon by the two parties for maintaining an adequate separation between the two classes of lines so as to avoid interference, this shall be done. In case it is impracticable to secure adequate separation between a power line and a communication line, parallelism will be permitted subject to the conditions set forth in II.

II. Conditions under which Parallelism will be Permitted.

a. *Minimum Horizontal Separation.*—The minimum horizontal separation between the power line and communication line shall be equal to the height of the taller line. The only exceptions to this provision are angle crossings and other unavoidable cases of close proximity, and in all such cases the power line shall be kept above the communication line and constructed in conformity with the National Electric Light Association's specifications for overhead crossings or other approved equivalent which may be agreed to by both companies.

b. *Balance of Power System.*—The power company shall exercise due diligence to keep the currents in, and the voltages to ground of, the conductors of any power circuit involved in a parallel, as closely balanced as practicable. In all cases where telephone circuits are involved, special consideration shall be given to the prevention or elimination of harmonics in the residual current and in the residual voltage.

c. *Limitation of Residual Currents and Voltages.*—Pending additional rules on specific means other than those given herein, the parties concerned shall endeavor to agree upon the means to be employed for the prevention or limitation of residual currents and voltages, and in the event of disagreement the matter shall be referred to the Railroad Commission of the State of California.

d. *Transpositions Inside Limits of Parallel.*—An adequate system of transpositions shall be installed in the power circuit (or circuits), and in the communication circuit (or circuits) provided the latter is metallic. When both circuits are transposed the transpositions in both the communication and power circuits shall be located with due regard to each other.

Every reasonable effort shall be made by both parties concerned to fix the limits of the parallel and the location of crossings, branch lines, and connected apparatus so as to facilitate the application of an effective transposition scheme.

In the case of a parallel between a power line and a telephone line the company owning or operating the telephone line involved shall have the right to specify the number, type (in respect to electrical characteristics) and location of the transpositions in the power circuit subject to the following limitations:

1. For power circuits of 50,000 volts or over the average distance between successive transpositions shall not be required to be less than one mile and the minimum distance between any two successive transpositions shall not be required to be less than two-thirds of a mile.
2. For power circuits of less than 50,000 volts the distance between successive transpositions shall not be required to be less than one-sixth mile.

The transposition system of the telephone circuits shall be modified where necessary in order that the power and telephone circuits shall be, as nearly as practicable, mutually non-inductive.

For short parallels less than six miles in length (or short sections of longer parallels which have to be treated independently because of abrupt change in conditions) with power circuits of 50,000 volts or over, where it is impracticable to obtain an adequate balance by the location of transpositions in accordance with the limit specified above, the company owning or operating the telephone line involved shall have the right to specify the number, type and location of transpositions, provided the distance specified between successive transpositions is not less than one-half mile.

When necessary (due to variations in lengths of telephone transposition sections) in order to secure an adequate balance, a reduction of 10 per cent in the limiting distances between successive power circuit transpositions as given above, shall be allowed.

In the case of a parallel between a power line and a telegraph line or other grounded communication circuit, the location of the transpositions in the power line shall be with due regard to the limits of the parallel in order to form as nearly as practicable a balanced system. The location and type of such transpositions shall be as specified by the communication company, subject to the condition that the transpositions in the power circuit may not be required to be less than one mile apart.

In no case shall the power company be required to relocate poles or towers for the transpositions.

The parties concerned in any proposed parallel shall endeavor to agree upon a transposition scheme for such parallel in accordance with the above. In the event of

a disagreement, the matter shall be referred to the Railroad Commission of the State of California.

e. *Transpositions Outside Limits of Parallel.*—In addition to transpositions within the limits of a parallel, as provided in "d" hereof, each new power circuit isolated from ground (or extension of such existing circuit) which is constructed subsequent to the date when these rules become effective, shall be transposed throughout its entire length in such manner as to balance the electrostatic capacities to earth of its several conductors, so as to avoid inequalities among the voltages to earth of the several conductors, which would create inductive interference. Such transpositions shall not be more than eight miles apart, provided, however, that circuits less than three miles in length are not required to be transposed until they are extended to a greater length; except that extensions or spurs from existing lines, the electrostatic capacities to earth of whose conductors are balanced, shall be so constructed as not to change materially the balance of the existing lines to which they are connected.

f. *Uniformity of Parallel.*—To facilitate the application of effective transpositions, both parties shall endeavor to maintain uniform separation, uniform arrangement of conductors and uniform relative location of the two classes of circuits within the limits of a parallel. However, when it is feasible to secure a substantial increase of separation between the two lines for a considerable portion of a parallel, this shall be done, as such an increase of separation is of more benefit than uniformity.

g. *Transformer Connections.*—(1) On any power circuit involved in a parallel, no grounded single-phase, or grounded open-star transformer connections shall be employed.

Note: This does not apply to railroads operating alternating-current trolleys with ground return, which are covered by V.

(2) On a power circuit involved in a parallel, no star-connected transformers or auto-transformers with grounded neutral shall be employed, unless delta-connected secondary or tertiary windings or other equivalent means are used of suppressing the third harmonic components of the residual voltages and currents introduced by the transformers.

(3) Where single-phase loads are connected to a polyphase power circuit involved in a parallel, the power company shall endeavor to arrange successive connections of this type so as to equalize the loads upon the several phases.

(4) On a three-phase circuit involved in a parallel, the power company shall use, wherever practicable, a closed-delta connection in preference to an open-delta connection, and where the latter is employed an effort shall be made to distribute such connections equally upon the several phases.

h. *Switch Equipment.*—A power circuit involved in a parallel shall be equipped, between the source of supply and the parallel, with oil switches, all poles of which shall be mechanically interconnected for simultaneous action. With the exception of stations where an operator is constantly on duty, these switches shall be rendered automatic for short-circuits, grounds and abnormal neutral currents.

i. *Switching.*—All switching on all parts of a system connected to a circuit involved in a parallel which causes harmful transient disturbances in communication circuits, shall be done by means of oil switches, all poles of which are mechanically interconnected for simultaneous operation.

j. *Use of Air Switches.*—The use of air switches on a power circuit involved in a parallel is prohibited except for purposes of isolating sections of dead line, or for disconnecting transformers under no load. This applies to the entire power system, any circuit of which is involved in a parallel, unless such switching is so remote as not to cause harmful transient disturbances in the communication circuits.

k. *Abnormal Condition.*—A power circuit involved in a parallel shall not be operated at any time with an open, grounded or short-circuited line wire or wires or transformer winding.

l. *Devices for Indicating Abnormal Conditions on Systems Isolated from Ground.*—If a power circuit involved in a parallel is electrically isolated from ground, reliable indicating devices shall be installed at its source of supply to inform the operator immediately of abnormal conditions, such as grounds and wherever possible, open circuits, which have not operated automatic switches. Upon indication of trouble by such devices, the operator shall immediately open the oil switches and proceed in the manner outlined in "m."

m. *Proceed under Abnormal Conditions.*—In case of the opening of an oil switch due to an abnormal condition in a power circuit involved in a parallel, or any circuit supplying or supplied by the same, such switch may be closed once; if opened a second time, due to the continuance of the fault or abnormal condition, said switch shall not be closed again until the line has been sectionalized. The fault may then be located by energizing sections of line, provided that further sectionalization of the line be done in such sequence as to cause the minimum disturbance to parallel communication circuits, and provided further that where practicable the faulty section of line shall be energized but once in this process of sectionalization, where the fault exists within or beyond the parallel, until such fault is remedied.

n. *Ammeters in Neutral Ground Connections.*—Wherever a neutral ground connection is employed on a circuit involved in a parallel, an ammeter, suitable for measuring as accurately as practicable the current in the neutral under normal operating conditions, shall be installed in all neutral connections at the main generating and sub-stations on the power system electrically connected to the circuit involved in the parallel. The power company shall maintain a record of hourly measurements of the neutral current at all such points.

o. *Charging Electrolytic Lightning Arresters.*—Where a power system is equipped with electrolytic lightning arresters so charged as to cause inductive interference in communication circuits, the methods of charging the arresters shall be modified to eliminate the disturbances as far as possible. The charging of such lightning arresters shall be done at such time as to give the minimum liability of interference with communication circuit operation, preferably between the hours of 2 a. m. and 4 a. m.

p. *Wave Form of Rotating Machines.*—The power company shall make every effort to obtain generators and synchronous motors for use on all parts of the system, giving, as nearly as reasonably possible, pure sine waves of voltage at fundamental frequency. In no case shall the deviation from a pure sine wave exceed the limit set forth in the Standardization Rules of the American Institute of Electrical Engineers.

q. *Exciting Current of Transformers.*—In order

that the wave shapes of voltage and current may be distorted as little as practicable by transformers, the main line transformers employed on circuits involved in a parallel and on future extensions of such circuits shall have an exciting current as low as is consistent with good practice, and in no case shall the exciting current at rated voltage exceed 10 per cent of the full load current. Such transformers shall not be operated at more than 10 per cent above their rated voltage.

III. Provisions Applying to Existing Parallels.

The following sections of II shall apply also to power circuits involved in existing parallels; b, i, j, k, l, m, n, o, p, and q. Also g-3 and g-4 shall apply to existing parallels to the extent that transformers added hereafter shall be connected as provided in said rules.

VI. Waiver of Conditions by Communication Company.

At the option of the company operating the communication circuit or circuits, any of the provisions of II and III may be waived.

V. Parallelism with Alternating-Current Railways.

It is recognized that railroads operating alternating-current trolleys with ground return create serious inductive interference with parallel communication circuits. In the present state of the art, no means for completely overcoming inductive interference from such parallels is known, hence they are to be avoided if possible and where unavoidable, the responsibilities arising therefrom must be settled by mutual agreement or in case of inability to agree the matter shall be referred to the Railroad Commission of the State of California.

DISCUSSION OF RULES.

It will be noted from the definitions that the terms "power circuit" and "telephone circuit" are used in these rules in a special, restricted sense.

(I) The first and most obvious means of preventing inductive interference is to avoid the close association of power and communication circuits. Further, it is recognized that in no other way can complete freedom from interference be secured. While with the ever-increasing network of electrical circuits of all kinds, adequate separation to avoid interference is becoming increasingly difficult to maintain, the committee feels that the importance of such separation justifies its being made the first premise in rules designed to prevent inductive interference.

Notice, sufficiently in advance, should be given the other party or parties concerned in any proposed parallel in order that thorough consideration may be given by both parties to possible means of avoiding the parallel, or, in case the parallel cannot be avoided, to the necessary remedial measures to be employed.

(II-a) The best insurance against physical hazard in cases of close proximity is to maintain a separation equal to the height of the taller line, thus avoiding the possibility of physical contact in case of failure. In the case of crossings and unavoidable cases of close proximity for short distances extra-strength construction is necessary as a precaution against failure.

(II-b-c) As has been pointed out under the heading "Results Accomplished," and more fully explained in Appendix II, residual voltages and currents are particularly troublesome factors in causing interference. Means to eliminate or reduce such residuals in power systems are highly important, and while information at this time does not enable the committee to formulate as explicit a rule as is desirable, yet the importance of the subject justifies its inclusion in the rules. The acquisition of further information on which to base a more explicit rule upon this subject is a most important problem, the experimental study of which is discussed in the following section of this report.

(II-d) Transpositions properly located in both power and communication circuits offer the most reliable and effective means for preventing interference from balanced voltages and currents of power circuits. While the inductive effects increase in severity for the higher voltage circuits, due in part to the increased separation of the line conductors, which renders more frequent transpositions desirable, the mechanical difficulties involved are so great as to overbalance the other reasons and the rules, therefore, provide for less frequent transpositions in the higher voltage circuits than in the lower voltage circuits. A further reason for frequent transpositions in the lower voltage circuits is the necessity of a flexible system of transpositions applicable to short parallels which generally occur with such circuits.

(II-e) The provision requiring transpositions outside the limits of a parallel on systems electrically isolated from ground is an explicit measure for carrying out the purpose of the more general provision given under II-b-c, "Balance of Power System" and "Limitation of Residual Voltages and Currents."

(II-f) Non-uniformity of separation and type of construction within the limits of a parallel are inequalities which cannot in many cases be taken into account in the design and layout of transposition schemes. Such inequalities tend to nullify the effectiveness of the transpositions. Hence it is desirable that they be avoided. A precautionary statement is included in the rule in order that the possibility of securing a wide separation for a considerable portion of a parallel may not be sacrified for the sake of absolute uniformity throughout the entire length.

(II-g) Some types of transformer connections and methods of operation give rise to large residual voltages and currents, and certain provisions of the rules are designed to prohibit or restrict the use of such connections and methods of operation. These rules may be considered as explicit provisions complying with the general provision in II-b-c, "Balance of Power System" and "Limitation of Residual Voltages and Currents." The sufficiency of these specific provisions as an insurance against harmful residual voltages and currents is subject to future determination.

The present information of the committee does not warrant the definite recommendation of any one type of connection or method of operation as best from the standpoint of inductive interference. This is true as to the relative merits of the two general types of systems, the grounded neutral and the isolated system. The advantages and disadvantages of these general types and any modifications of these types are dependent upon their inherent characteristics in respect to residuals and the limitations and control of residuals under both normal and abnormal conditions. Both types are on an equality with respect to the interference caused by balanced voltages and currents.

(II-k) Continued operation under certain abnormal conditions is possible in some power systems. In particular, it is possible to operate a grounded star-connected system with one phase open, and it is possible to continue the operation of an isolated system when one phase becomes grounded accidentally. The former gives rise to a large residual current and the latter to a large residual voltage, both of which are liable to render parallel communication circuits inoperative. For these rea-

sons the rule prohibits such operation which, aside from the consideration of inductive interference, does not constitute good practice in power system operation.

(II-h-1-n) To provide that operation under the normal conditions mentioned above may not continue without the knowledge of the power company, the rules specify that devices for indicating grounds shall be installed on isolated systems. With respect to grounded star-connected systems, the rules specify with certain exceptions the automatic opening of switches by abnormal neutral currents. In such systems ammeters are required in all main neutral ground connections. Such ammeters, read regularly, afford means of detecting abnormal neutral currents and are of value in showing the degree of balance of the system, as the neutral current is easily affected by unbalanced conditions.

(II-m) Accidental causes give rise to occasional abnormal conditions. These can only be guarded against by good construction and maintenance, and careful operation which, however, cannot prevent entirely such occurrences. When trouble develops on a power circuit involved in a parallel, it is always liable to cause serious interference to the communication circuits if the exposure is severe. In the present state of the art, the method of fault location on power circuits is a process of repeated sectionalism and energization of the faulty line until the fault is located within certain limits. This process causes repeated interruptions with loss of time in the operation of the communication circuits, and in the case of telephone circuits is accompanied sometimes by injury to the operators. It should be explained that the loss of time is much greater than the duration of the disturbance, owing to the time required to restore the protective devices on the communication circuits to their normal condition. No method of locating faults on power circuits is known which meets the requirements of practice and yet avoids the disadvantages of the present method. The inductive disturbances due to fault location can be to a considerable degree ameliorated by disconnecting the faulty line from the rest of the system and energizing this line by a single generator at such excitation as may be necessary to overcome the insulation of the fault. Whenever practicable this method is employed by power companies. Hence it has not been thought necessary to cover it by a specific rule.

(IV) Since these rules are designed for the protection of communication circuits, it is proper that the companies operating such circuits be given the right to waive any measures of protection which they may in any particular case consider unnecessary.

(V) The committee has undertaken no investigation of cases of parallelism with alternating-current railways, but as the seriousness of this class of exposure is recognized, it was thought desirable that it be referred to specifically.

FUTURE WORK.

The further work necessary in order to secure the information essential as a basis of determining more explicit and effective rules than those herein recommended, is particularly concerned with the subjects of transpositions and residual voltages and currents. In order to cover these subjects in as effective and economical a manner as possible it is thought that the procedure should be along the following lines:

1. Experimental study of transpositions, which includes the determination of:

a—the practical effectiveness of transpositions in both power and communication circuits as a means of reducing induction arising from balanced voltages and currents; involving considerations of different coordinated transposition schemes particularly with different lengths of power circuit "barrels."*

*See Appendix III.

b—the practical effectiveness of transpositions in communication circuits as a means of reducing inductive interference arising from residual voltages and currents; involving considerations of different systems, particularly different lengths of balanced communication circuit transposition sections.

c—the influence of imperfect electrical balance of communication circuits in impairing the effectiveness of transpositions.

d—the practical effectiveness of transpositions in a power circuit isolated from ground as a means of balancing the electrostatic capacities to earth of the several conductors, and thereby reducing residual voltages and currents; involving considerations of the relative efficiency of different lengths of power circuit barrels.

2. Experimental study of the causes and effects of residuals, including:

a—a comparison of the different types of power system connection and apparatus in common use and their characteristics in respect to the production of residuals, particularly harmonic residuals.

b—means to be employed in limiting residual voltages and currents.

c—a determination of the minimum values of residual voltages and currents which will produce harmful inductive interference.

It is thought that these two studies could progress simultaneously. The work indicated under (1) could best be done on an actual parallel selected to be as uniform and as free from secondary disturbances as possible. Some preliminary work has been done along these lines which indicates the best methods of procedure and this should facilitate the carrying out of the investigation.

The study mentioned under (2) consists in part of an investigation of the characteristics and magnitude of residual voltages and currents in typical power systems, both those with grounded neutrals and systems entirely isolated from ground. A part of the study of residuals is logically related to the study of transpositions and could be carried out in connection with the study outlined under (1) and at the same time and place.

In addition to the above, the committee has already arranged for the investigation of the two following subjects:

1—a determination of the detrimental effect of extraneous currents on a telephone circuit as a function of the frequency, including a determination of the maximum amount of extraneous current, of different frequencies and combinations of frequencies, which is allowable in a commercial telephone circuit.

2—a determination of the effects of extraneous current of different amounts and characteristics, in limiting the speed of telegraph operation.

This work is now in progress.

(To be continued.)

Condemns Dunns by Telephone

The view of a county court judge that the action of money lenders in ringing up a debtor at his employer's office constitutes "electrical trespass" is indorsed by the British *Law Journal*, which states: "To ring the telephone at another person's house in order to put pressure on some person employed there is not only a most offensive thing to do, but is an insufferable trespass for which, no doubt, substantial damages could be recovered by the owner."

At Marconi's request the director of the Florence observatory has equipped the cathedral with a wireless antenna, whose wires hanging from the cupola were in a closed space. During the night, signals from Paris, Toulon and Madrid were received clearly and with a strength which were not less than those in the open air.

Telephone Order System for Handling Customers

Presented Before the Electric Sales Managers' Convention

BY HAROLD WRIGHT

THE purpose of the application bureau of the contract department, Commonwealth Edison Company, Chicago, is primarily to supply all applicants with authoritative information regarding pending orders in a courteous manner, and in the shortest possible time; to take applications for apartments and residences; read and disconnect orders; cut-off orders; salesman's calls or leads; changes in original orders; and supply miscellaneous information regarding electric serivce, such as cost of electricity; rental propositions; wiring; Mazda lamp prices; answering questions regarding newspaper advertising; in fact, any information which the applicant may request, relative to the company's methods in supplying service and rates in connection therewith.

The following is an outline of the manner in which orders for the installation and discontinuing of electricity are filed, pending their completion; the method of keeping the status of orders to date, and the method of taking orders over the telephone and supplying information regarding pending orders.

To accommodate the large number of orders which it is necessary to handle during the moving seasons (occurring twice each year), it is necessary at the present time to have the city street numbers divided into eight (8) divisions, as follows:

Street numbers from	1	to	499, inclusive, call	249
Street numbers from	500	to	1099, inclusive, call	248
Street numbers from	1100	to	1699, inclusive, call	247
Street numbers from	1700	to	2499, inclusive, call	246
Street numbers from	2500	to	3499, inclusive, call	245
Street numbers from	3500	to	4799, inclusive, call	244
Street numbers from	4800	to	6099, inclusive, call	243
Street numbers from	6100	to	14000, inclusive, call	242
Street corners				242

Each local telephone number as specified above reaches the file clerk who files original orders, reads the reports regarding pending orders and removes completed orders. All files are constantly checked by each file clerk to correct any errors in filing of orders in her file. In order to provide a further check, one clerk is constantly checking all files. In this manner the pending files are kept as nearly correct as they possibly can be.

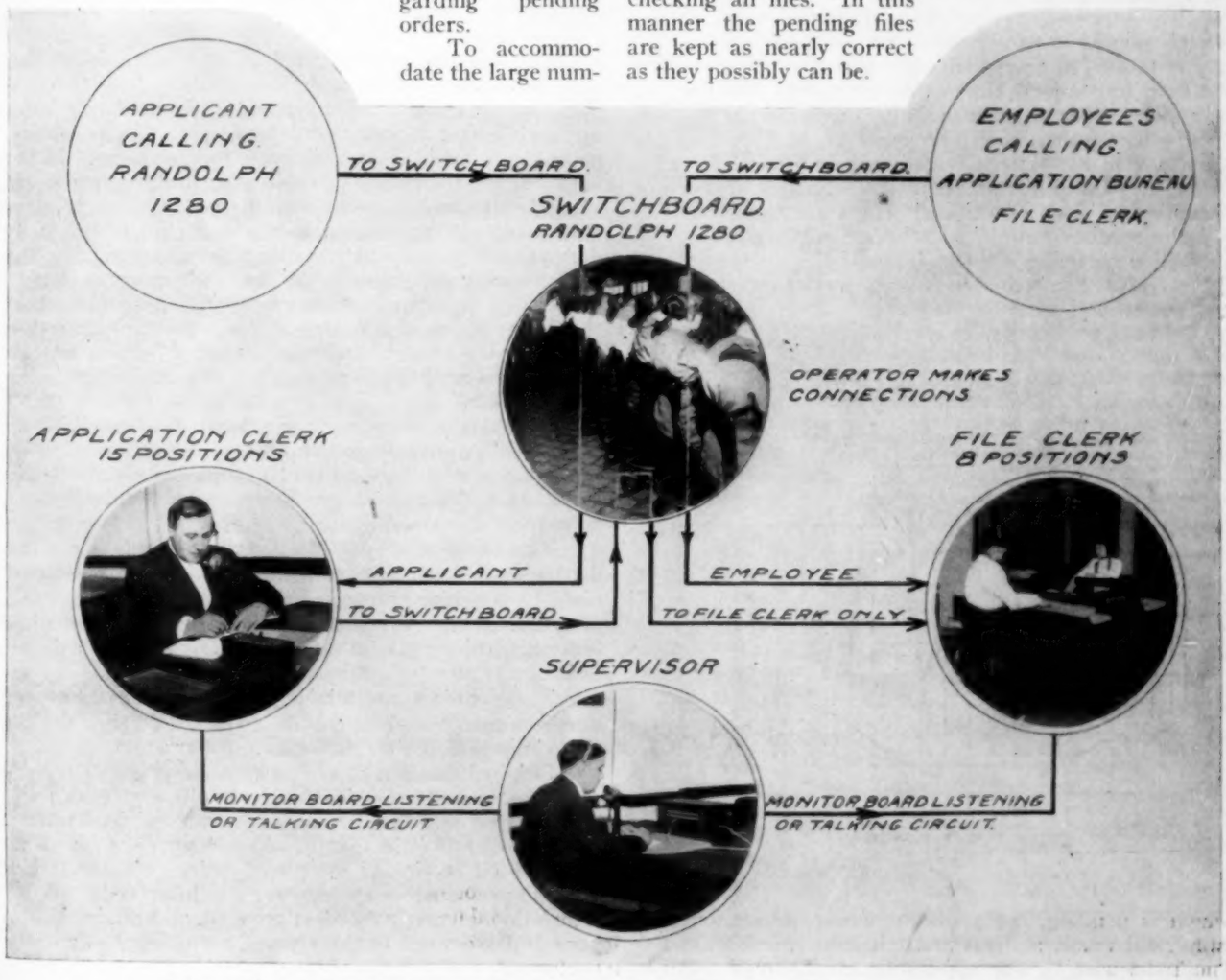


Diagram Showing Telephone Arrangement of Application Bureau, Commonwealth Edison Company, Chicago.

Copies of all original orders relative to supplying and discontinuing electric service are issued by the application bureau and are distributed to the various departments interested for execution. The original orders are filed in the "pending file" of the application bureau.

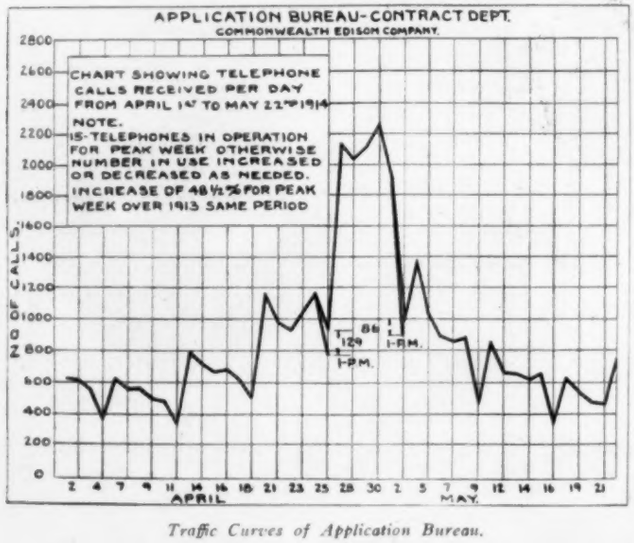
To supply the public with the status of any and all orders, miscellaneous information, to take application, cut-off orders and read and disconnect notices, "salesman's calls or leads," requires (to give first class service), men "application and telephone order clerks," whose experience with the company fits them for the position.

These men are conversant with the policy of the company and also with the routine of all classes of orders and the manner in which these orders are executed, having received special schooling in the methods in use in executing orders, by observation and instructions through personal contact with the men doing the practical work.

This schooling is constantly going on as methods of doing work and rules governing wiring are constantly changing with progress in the business. The imparting to customers of all information requested, both as to its correctness and the courteous manner in which the customer is addressed, is a part of the schooling these clerks receive from the supervisor.

Applicants calling the Commonwealth Edison Company regarding electric service are referred to the application and telephone order clerks. If the applicant wishes electric service in an apartment or residence, the application is taken (to be signed when a company repreesntative calls to complete the order), or should the applicant be a storekeeper or manufacturer, the salesman is given a call which is attended to the same or the following day according to the time it is reecived. Orders to cut off meters, read and disconnect meters, changes in dates of execution as sown on original orders are taken and follow the regular route of such orders. Miscellaneous information regarding the supplying of electric service and the rates in connection with that service are carefully and courteously given.

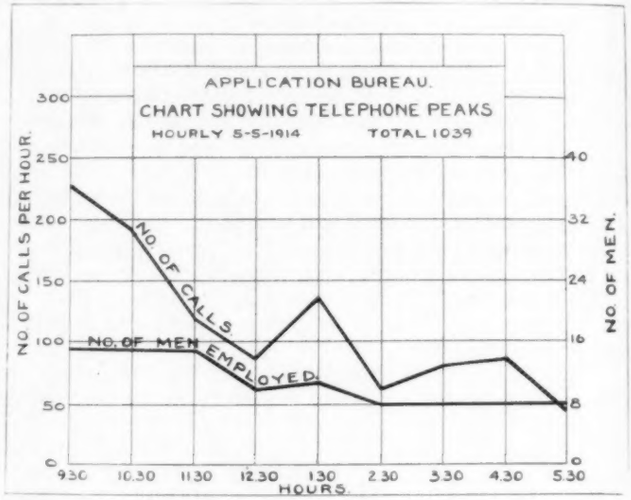
Should an inquiry be received relative to an order


APPLICATION BUREAU-CONTRACT DEPT.
COMMONWEALTH EDISON COMPANY.
CHART SHOWING TELEPHONE CALLS RECEIVED PER DAY FROM APRIL 1ST TO MAY 22ND 1914
NOTE.
15-TELEPHONES IN OPERATION FOR PEAK WEEK OTHERWISE NUMBER IN USE INCREASED OR DECREASED AS NEEDED.
INCREASE OF 48½% FOR PEAK WEEK OVER 1913 SAME PERIOD
NO OF CALLS
APRIL
MAY

Traffic Curves of Application Bureau.

which is pending, the applicant would be requested to supply his name, address and telephone number, and to "hold the wire." The application clerk would then reverse the two keys, in this manner hold the customer on one line and would request the switchboard operator to connect him with the local telephone according to the applicant's "street number" (first referring to the schedule).

In this manner the "file clerk" comes in on the line and answers "Local 243."



Daily Record of Calls Per Day.

The application clerk questions, "What is holding ..... street number?"

The file clerk "with hands free" immediately looks up such street number and questions, "What is the name?" (to avoid giving incorrect information). If the names agree, the reason or reasons for holding are given.

The data necessary to keep the status of pending orders to date is forwarded to the application bureau by departments as soon as possible after the receipt of the orders in any department. When it is necessary to hold orders in a department for a longer period than usual, or should the status of an order change, an additional report is forwarded to the application bureau. These reports are attached as they are received, to original orders in the "pending file."

Should it be necessary for a department receiving an order to forward to another department an order to do some part of the work which has to do with the original order, that department would also report in the same manner as described above.

The filing of copies of all orders issued to various departments is done by women file clerks who are supervised by a senior woman clerk. As soon as the orders are received they are immediately sorted into numerical order according to street number as shown on the original order.

These orders are divided according to the street numbers each file clerk controls, and on receipt, the file clerk immediately files the order.

Original status reports and subsequent status reports are also attached to original orders by the file clerks, these being sorted and distributed as are the original orders. The removal of orders completed is also the work of the file clerk on receipt of completed orders. These orders are also previously sorted to street number order. After completion, all original orders are filed, and retained for a period of from one to three years, according to their importance.

The time occupied to question an applicant depends

both on the ability of the clerk to comprehend the applicant's question, and upon the applicant's ability to "talk" on the telephone. Information from the file clerk is given in from 25 to 45 seconds and usually the entire transaction consumes from one to one and one-half minutes.

Where the applicant is not fully convinced that the company is ready to supply service but for some reason cannot do so, he usually asks for the manager, who in this case is the supervisor. When such applicant reaches the so-called "manager" his attitude is usually changed, and he is satisfied that the information imparted originally was correct.

By means of the schedule heretofore shown, employes may call (particularly salesmen) and receive the status of any pending order within the same length of time as do the application clerks.

The duties of the supervisor are as follows: To school clerks in dealing with applicants; to handle unsatisfied applicants; to check all departments whose status reports to the application bureau are tardy or not received; to prevent unnecessary conversation between applicants and application clerks, application clerks and file clerks, and between file clerks and employes of the company. (Employes call the file clerks direct.) This is possible as all application lines are wired through the monitor board, the supervisor being able to listen to any conversation or (by changing the position of a common key), to speak to persons engaged in conversation.

Iowa Companies Must Obtain Franchises

Telephone corporations which operate in Iowa under what they declare to be perpetual franchises were given food for reflection in a recent decision handed down by Judge Charles A. Dudley of the Des Moines district court, in which he declared the Iowa Telephone Company must secure a franchise from the city of Des Moines, or vacate the streets.

The telephone companies operating in Iowa have put forth the claim that they do not come under the 25-year franchise law, but have perpetual franchises, having secured their rights before the 25-year low was enacted by an Iowa assembly in 1897. In the Clinton city council there has been discussion in past years as to whether or not a local telephone company operating under the 25-year franchise law or has perpetual rights. The matter has never been brought to a show-down, however. The decision of the Des Moines judge is likely to arouse interest in the question throughout the entire state, and other cities may demand that telephone companies ask for 25-year franchises instead of operating perpetually under their original grants.

The supreme court some time ago rendered an opinion in which it held that telephone companies organized since 1897, or subsequent to the enactment of certain measures by the legislature authorizing a reasonable regulation of such companies, were compelled to obtain franchises. The high court, however, did not consider the effect of the law of 1897 on companies organized prior thereto.

Having occupied the streets of Des Moines and expended large sums of money in equipment and betterments under section 1324 of the code of 1873, the Iowa Telephone Company contended that the city was without power to compel it to obtain a franchise as provided by sections 775 and 776 of the code of 1897, which were enacted subsequent to the initial installation of the defendant's system.

A brief analysis of the case as given by Judge Dudley is as follows:

In 1873 the legislature passed a law giving corporations the right to construct lines. Subsequently this act was amended and the word telephone inserted.

A few years later a suit was instituted by one Chamberlain of Des Moines, testing the right of telephone companies to run their wires and poles through the city. The legislature having given telephone companies the right to use the public highways held that a city street was the same as a road, and therefore ruled against plaintiff.

In 1897 the legislature passed a section known as No. 776, which authorized regulations as to electric wires. Section 776 enacted the same year virtually provided that all telephone companies, thereafter organized must obtain a franchise from the city in which they operate.

Lawyers for the telephone company argued that these sections, being subsequent to section 1324 of the code of 1873 had no effect on its right to operate without a franchise because of the rights granted by the old statute.

The question then arose as to whether the rights of the company under the law of 1873 would be impaired in the event that they were forced to obtain a franchise. The court held that the presence on the statute books of section 1891, in which the legislature reserves the power to amend articles of incorporations of corporations and impose new conditions necessary for public good, permits the city to force the telephone company to secure a franchise and that such action would not constitute an impairment of the rights of the company under section 1324 of the code of 1873.

James L. Parrish, of Parker, Parrish and Miller, attorneys for the telephone company, said the case would be appealed.

Ornamental Disguise for Telephone

Quite the latest thing in the way of a telephone accessory is the telephone cosey, which furnishes an ornamental disguise for the instrument in a handsomely furnished room or hall.

This novelty usually takes the form of an elaborately dressed manikin, whose full skirt is mounted on a wire foundation of a size to conceal the telephone as it stands on table or desk. At the waist line the skirt is attached to the upper part of a doll's body. The head and shoulders of the figure serve as a handle for the cosey, so that it can easily be lifted off like a bell when the telephone is to be used.

Another model, not so simple of adjustment, has the fullness of the skirt arranged to open under a front panel, allowing the telephone to be drawn forward for use, leaving the manikin in its original position on the table.

Where the telephone is in a luxuriously fitted boudoir the cosey is often of art, the silk or satin skirt of the figure being draped with lace and caught with tiny artifical roses and the shoulders covered with a fancy lace scarf.

Sometimes a doll's parasol or a fan dangles from one arm.

An elaborately draped cloak is arranged effectively over one of these wired foundations and a bit of marabou is used as a neck trimming. Old time fashion plates and portraits are taken as models and every detail is accurately carried out.

Uniform Methods of Toll Accounting

An Address Presented Before the Convention of the Indiana Independent Telephone Association

BY W. S. VIVIAN

IT IS obvious to the most casual observer that the benefits to be derived from a system of operating that will bring about standard, uniform and efficient methods are many and varied. There may be a few who have not learned that a system of toll operating has been devised, with particular reference to the needs and requirements of the thousands of companies both large and small in the independent telephone field, that is simple yet effective; that not only meets the needs and requirements of the largest of the independent companies in a practical way, but also meets the needs and requirements of the middle size and small companies in an equally practical manner. Further, that this system of work is in successful operation in a number of states, covering a considerable portion of the United States at the present time and has and is securing splendid results.

This system was first adopted by the Michigan Independent Telephone and Traffic Association after a committee had spent a good deal of time and effort in determining the needs and compiling regulations which would meet these needs and after receiving very careful consideration at the hands of the board of directors of the association. Later they were adopted by the Telephone Service Association and when the Service Association was merged into the Independent Telephone Association of America, these rules became the standard long distance operating rules of the Association, since which time their use has spread into a number of states as a result of the work of the Service Department of the Association.

One company which operates a large system, after using it for a considerable time, refers to it in its annual report in the following language:

> The State Traffic Association has perfected and introduced a comprehensive system for the handling of long distance traffic. This method or plan contemplates that all operators shall act as a unit in furnishing quick service in a uniform manner. Great improvement to the service has already resulted from this new system and the earning capacity and value of lines have been materially increased by the elimination of much unnecessary conversation between operators at switching points. Notwithstanding the increase in the toll traffic the lines of the company are less congested than they were before the new system was adopted.

A later annual report of this same company again states:

> The continued growth of the toll earnings is ample proof of the great value of the long distance lines of this company. The most careful attention has been given to keeping the toll lines in the best possible condition. Careful inspection of the lines is made at regular intervals that any defects may be discovered and repairs made in time to prevent an actual interruption of the service. It is of equal importance that the use of the lines be conserved so far as possible for the transmission of the actual revenue earning business. With this end in view the management is paying special attention to the instruction that is being given to the toll line operators. The wisdom of this policy must be apparent to all, as it can be readily seen that the earning power of the toll line investment depends very largely upon the efficiency of the operating force. The training given to the operators is thorough and comprehensive and has enlisted the hearty support and co-operation of every operator. This earnest endeavor to improve in efficiency has resulted in quicker and better service and has made it possible to handle the increased business without the necessity of building additional lines.

The last annual report of this company shows that it owns 10,288 telephones and that its toll receipts were $66,666.71 or $6.48 a station; the highest amount per station of any independent telephone company of which the Association has record.

This was accomplished by means of an active and hearty co-operation with an association, on the one hand, and a well-defined and complete policy on the other hand, consisting of well-maintained lines, judicious advertising and publicity, operators' schools and operating rules.

I venture to say there are companies whose toll receipts are not more than one-third of the amount per station above quoted and many that would not run much over one-half. I venture to suggest further that one very important reason is that they have not got right down to a genuine, active co-operation in a concerted manner with an association organized to carry on this kind of work.

In the independent telephone field we have had many associations that have generally accomplished much good; still, unfortunately, associations that have standardized the several departments of the member companies in an effective, aggressive and still harmonious manner, calculated to increase operating efficiency, have been, as the saying goes, "as scarce as hen's teeth."

What the independent telephone companies of this country now need in a big, broad way is an association to which thy can come for information along all lines. An association whose real business is to develop and make permanent in a profitable manner the independent telephone industry. To get the best results we must have faith in each other and faith in the business. We must be willing to give and take and to sacrifice some of our own individual hobbies and ideas for the sake of having a system.

It must be clear to every man that if we are to have a system, it is manifestly impossible for every man to have his way. He must be willing to abide to the best judgment of the organization. It is also clear that every man will not agree to do this unless it can be clearly shown that it will actually improve operating conditions and bring added revenue to his particular company. This we claim our system will accomplish. Let us, therefore, notice a few of our present conditions.

Until recently there were just as many different ways of handling our long distance messages as there were companies. This resulted in a loss of 50 per cent of the earning efficiency of our long distance lines, because of the many unnecessary words, signals, delays and misunderstandings experienced. Not only is that true, but your records show that you are now losing from one cause or another one out of every seven tickets offered, or 15 per cent, and of the business completed the records show that checking errors arise to the extent of 15 per cent more; and this is not all, for, due to improper methods and equipment in checking overtime, we believe there is another loss which is equal to another 10 per cent of your revenue.

The direct loss that can be checked amounts to millions of dollars annually, and the losses due to inefficient use of the circuits amount to another million of dollars

each year. These are facts which can easily be checked and verified.

If any of you will go to almost any terminal and tabulate the tests, signals and conversations passing between operators in different exchanges during any fairly busy hour, you will find that 50 to 75 per cent of the work is entirely unnecessary.

Our system of rules contemplates:

First, that each operator shall receive a proper understanding of the importance of the service she is furnishing to her company on the one hand and to the subscriber or patron of the company on the other hand; that the apparatus she is handling and the circuits over which she routes her tickets represent an enormous investment; that this investment should be used in a most careful, systematic and economical manner; that the exchange in which she is employed is one, but only one of thousands, of independent telephone offices; that constantly and continuously there are messages originating in all of these offices destined to many places; that in order that each of these thousands of messages may be put through quickly and without unnecessary delay, that in a general way each ticket must be considered of equal importance with every other ticket, and that the ticket originating in any particular office shall not receive any preference over those of any other particular office; that her business is to get them through and out of the way in the least possible time without regard to the place of origination or destination; that the spirit of the rules should at all times be applied; that if the individual operator fails at any point, she, of necessity, compels some other operator somewhere else to be irregular.

In the preparation of these rules we have aimed definitely to place the responsibility on an operator at each of the various stages of its completion.

After proper instruction in the use of the apparatus she is called upon to handle, the necessity of reporting cases of trouble, criticism and complaints, and how they should be handled, and the importance of developing an altogether pleasing personality, as indicated by the voice used, she is then ready to receive instructions as to the methods used in handling the business. Briefly told, the plan is as follows—and as we describe this bear in mind that it is aimed to have every operator in every office be absolutely uniform in their work as to the methods and phrases used. It is designed to have each phrase that the operator uses positive, clear and such as will be easily understood.

A subscriber wants to pass a ticket to a long distance operator. He rings and asks for Long Distance. The long distance operator, as she receives the signal, makes the connection and answers by saying: "This is Long Distance." Upon hearing these words, the subscriber knows that he has the ear of the long distance operator. He does not have to ask any questions to make sure that this is long distance, as the answer given him plainly indicates that fact. He passes his ticket to the operator in whatever way meets his fancy and convenience. As he passes the information the operator records it on a standard TA-4 toll ticket, which is designed to meet the requirements of our particular system of work.

The operator, because of her familiarity with the facilities available for completing the ticket and with the possibility that the person asked for may or may not have a telephone, that he may or may not be at the telephone, that it may be necessary to send a messenger, that he may be out of town, or numerous other things may prevent the ticket from being immediately completed—because of her knowledge of these facts, she secures in a diplomatic and agreeable manner such information as will enable her promptly and effectively to dispose of the ticket, regardless of what obstacle may arise which will prevent the ticket from being immediately completed.

She will find out, if the party has no telephone, whether she will send a messenger, and if so the maximum charge authorized; if the party asked for is not in, if calling party will talk to anyone else. If calling party will not talk to anyone else, if she shall leave word for him to call upon his return. If he is gone to some distant point, whether she will locate and reach him, wherever he may be. She will use care as to the address and the nature of the business, so that while she passes the ticket in the authorized manner and if the terminating operator reports back indicating that some additional information is necessary, she will immediately know just what to do without having to call back the calling party and ply him with additional questions, much to his annoyance and disgust oftentimes, and always to the direct financial loss of the long distance company or companies.

After the operator has this information properly recorded, she is then ready to do the actual work of putting the ticket through.

Her first step is to test the circuit. This is done in the following manner:

She inserts her calling cord in the jack of the desired circuit and then listens to make sure that there is no one using the circuit. As soon as this is determined, she tests by using the phrase, "This is Indianapolis, are you waiting?" "Are you through?" and in using this phrase it is spoken slowly and distinctly, allowing plenty of time for anyone to answer the challenge if the circuit should be in use, although no actual conversation is being carried on for the moment. If no answer is received after this test is made, the originating operator can proceed to use the circuit. She gives the proper signal for the office or switching station wanted. The operator is then drilled to be uniform in her manner of ringing. Our operators are instructed to give a signal of two seconds' duration for each ring and to allow at least fifteen seconds before repeating the signal. This is materially different from the present practice where oftentimes an operator will ring fifteen times in fifteen seconds, making it in reality a dangerous matter for the terminating operator to answer. Our plan emphasizes that each operator must have faith in every operator and must remember that other operators are working just as hard as to give good and efficient service as she.

When the terminating operator receives a signal she answers with the phrase "This is Logansport." As soon as the originating operator hears this phrase she knows instantly that she has Logansport and, therefore, the necessity for either or both operators calling "Hello" several times and asking the questions, "Who are you, what do you want, and whom were you ringing?" as is now so frequently heard, is eliminated. With our phrase the calling operator knows that she has Logansport and is immediately ready to pass her ticket. This, after careful consideration, has been reduced to the lowest possible number of words. If it is what is known as a straight ticket, where a subscriber of a certain telephone sends an ordinary sent paid ticket to Logansport, the ticket would be passed by the Indianapolis operator as follows:

"This is Indianapolis. No. 124 is calling Mr. Smith, or AY at 3:26," which gives the Logansport operator all the information that she needs to know for the immediate completion of the ticket. In passing this ticket the originating operator gives it very slowly and distinctly, thus making it unnecessary to have the ticket repeated one or more times, as is now often the case.

Our system contemplates that each and every operator will understand the necessity of concentrating her mind on the particular thing she is doing at all times, so as to remove the possibility of asking and answering questions. Many times each day, under present conditions, the terminating operator answering in response to a signal, answers automatically. Her mind is centered on some other ticket or connection that she is engaged in or has been engaged with. Then, after the originating operator has passed her ticket, the terminating operator begins a series of questions which run something like this:

"Whom do you want? Where did you say we could find him? Who are you? What is your number? etc.," all of which take much time.

When you consider that the average conversation is less than three minutes and that our scoring time runs from six to eight and oftentimes many more minutes, we can begin to see the importance of having every unnecessary work, signal and operation eliminated.

As the originating operator passes this information, the terminating operator, with her mind concentrated upon her work, writes it down carefully on a TA-5 standard received ticket. If she is sure she is right, she immediately acknowledges by saying, "Just a moment," and proceeds to complete the connection. She rings the desired number and as soon as the voice answers she says: "Long Distance is calling Mr. Smith." This is one of the shortest and best phrases we have ever seen. It goes right to the desired point without beating around, as is now so frequently done by means of various questions, running like this: "Is this No. 326? Is Mr. Smith there? Will you please call him?" With our phrase, if Mr. Smith is an up-to-date subscriber, he will say when he answers the telephone: "This is Mr. Smith," or if it is some particular firm will answer with the firm name. If he answers by saying: "This is Mr. Smith," the operator knows she has the desired party. If, however, he answers with the obsolete word, "Hello," the phrase, "Long Distance is calling Mr. Smith," will bring forth the reply, "This is Mr. Smith," or if it was not Mr. Smith speaking, he would say, "Just a moment; I will call Mr. Smith." Or if he is not there, "Mr. Smith is not here. Will anyone else do?" Regardless of the condition, the phrase of itself will bring forth a reply from whoever answers the telephone that will give the operator the information she needs. If Mr. Smith is there, the connection is established in the following manner:

The terminating operator reports to the originating operator who is on the line "WH," which means, we have your party on the line. As soon as this report is received originating operator signals her calling party, who at the time ticket was recorded was told that the connection would be completed in just a moment and requested him to be at the telephone, so that he immediately responds to her signal. As soon as he responds the operator uses the phrase, "We have Mr. Smith at Logansport for you," and the conversation takes place. As soon as the parties are on the line and the conversation actually started, the time is checked. If they talk fifteen seconds after the time scheduled no extra charge is made, but if they talk more than fifteen seconds and not over four minutes, the four-minute time is checked.

Time will not permit us to go into the great mass of detail necessary in handling our long distance work, such as special calls that have to be handled, pay station calls, passing the numerous and various reports, taking care of special conditions that arise, etc.

Permit me to say, however, in conclusion, that these rules have now been in actual operation for about two years; that they have proven practical in all offices under all conditions with operators who have to handle business over Bell lines as well as over independent lines. They harmonize reasonably close to the Bell instructions along these lines. With them you will find that you can handle a greatly increased volume of traffic over the same circuits with less congestion than formerly. You will find that the operators will be more enthusiastic under this system of work, as they who are on the firing lines constantly realize its advantages even more than the average manager who is not in such close touch with the details of long distance operating. You will find that if the spirit of these instructions is encouraged, the percentage of lost tickets will be greatly reduced, which will mean an increased earning that will give you additional money for the purpose of building additional lines, which will enable you to handle more business and have greater profits.

Trade Directory of South America

A complete revision and detailed classification of the names of South American importers and merchants, made by the American consular officers in co-operation with the Bureau of Foreign and Domestic Commerce, has been published as a section of a new edition of the World Trade Directory. The lists have been brought up to date and are presented in uniform style, with a finding index.

A new feature is the listing, so far as the information could be obtained, of (1) the American and other foreign agents of South American importing firms, and (2) of the names of the parent firms of branch houses located in various South American cities.

The directory does not aim to include the names of South American exporters, nor are the names of manufacturers given, except those who are, or seem likely to become, purchasers of American materials or merchandise. The publication is a directory of South American buyers for use by exporters and manufacturers in the United States.

The directory is in octavo form, bound in buckram, and is sold at $1.00 a copy, to cover partially the cost of printing. Those desiring one or more copies of this directory should apply to the Bureau of Foreign and Domestic Commerce at Washington, D. C., for the necessary order blank.

A. M. Calzada, president of the Moka Cuban Coffee Company of Cuba, has been given permission by the director general of telegraphs to install a telephone line from the plantation of the company to the city of Santa Clara. Philip Wilson, general manager of the Development Company of Cuba, has made a request to the government, which has been favorably reported by the department of telegraphs, to install a private telephone line connecting the various stations on the plantation of the company at Ceballos, Camaguey province.

The Telephone Scrap Book

Curious and Useful Items, More or Less Telephonic, Gathered from Everywhere

An Australian Pole-Lifting Jack

THE accompanying photographs illustrate a pole-lifting device which has proved of considerable utility in Queensland, and which is now being introduced into the other states of the Australian Common-

Fig. 1.—The "Wallaby" Jack.

wealth, according to the *Post Office Electrical Engineers' Journal.* The jack itself (locally known as the "Wallaby" jack) is shown in Fig. 1, in which it is shown with a steel prong or fork slightly raised. By means

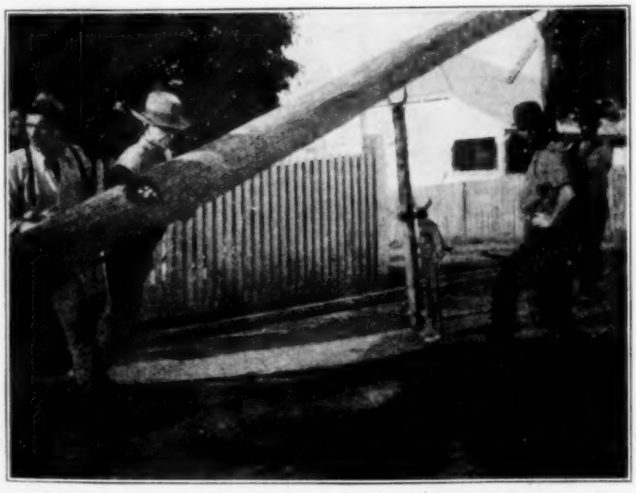


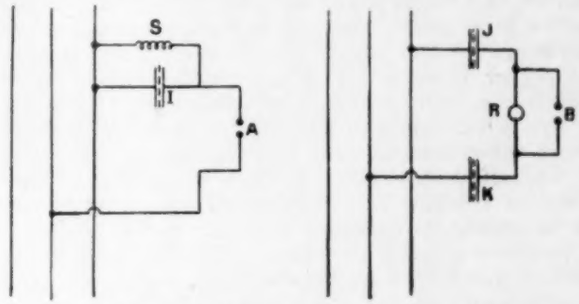
Fig. 2.—Raising a Pole with the "Wallaby" Jack.

of its use the number of men required to erect a long or heavy pole is greatly reduced. The pole is raised by means of lifting or levering into a position which admits of the prong of the jack being inserted thereunder. One man then suffices to work the jack, and the pole is lifted by means of the jack arm. The weight of the pole is then taken by a short pike or dead man; the jack can then be released and the movable arm lowered, and a pike of suitable length fitted into the holders which it carries. The method adopted is clearly shown in Fig. 2.

The operation of the jack has been found to be safe and effective. The device has certainly justified itself as a labor-saving one, and its extension to the other states after a lengthy experimental trial in Queensland has now been decided upon.

Telegraph Signals Over Transmission Lines

A SYSTEM for using the wires of an energy transmission line for sending signals from the generating plant to substations, etc., is based on the super-position of a high-frequency current on the wire current. The transmitter is shown in Fig. 1, where *A* is a spark-gap, *I* a condenser, and *S* an induction coil. *S* arrests the high-frequency current produced by the spark-gap, while the condenser *I* arrests the low-frequency current of the



Figs. 1 and 2.—Telegraphing Over Transmission Lines.

line. The arrangement of the receiving station is shown in Fig. 2, where *B* is again a spark-gap. *J* and *K* are condensers; *R* is a hot-wire relay or another type of relay, which on the arrival of a high-frequency current closes an auxiliary circuit containing a bell, etc. It is also possible to get visible signals by passing a strip of paper along the spark-gap *B* so as to get impressions of the spark. In order to send signals over the line, the spark-gap *A* at the transmitting station is adjusted to get sparks and produce high-frequency oscillations. Their duration depends on the adjustment of the spark-gap, and it is possible to send signals of variable duration over the line, such as Morse signals. Fig. 3 shows the continuation of a transmitter and receiver. The switch *G* is used for changing transmitting to receiving. Instead of using two line wires, as shown in the illustrations, it is possible to employ one line wire and an earth return.

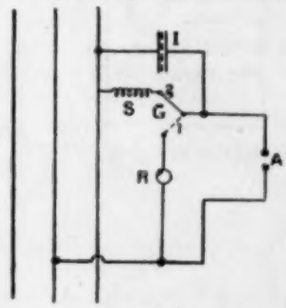


Fig. 3.—Telegraphing Over Transmission Lines.

Anchoring Telephone Drop Wires

IT IS no longer an uncommon thing to find a pay station telephone in depots and waiting rooms of trolley lines, but in installing this service a special kind of line construction is employed, says George M. Peterson in *Popular Electricity*. Fig. 1 shows the close proximity

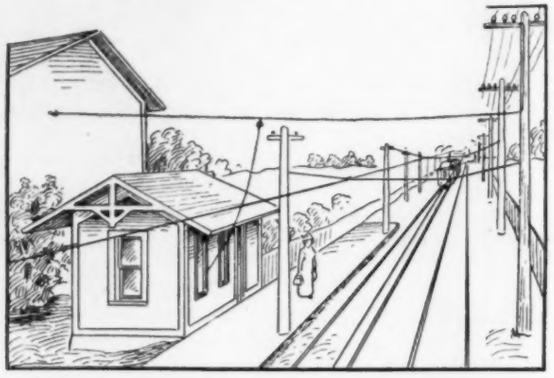


Fig. 1.—Running Bridle Wire Over Trolley Line.

of the telephone drop wires and the trolley wires in bringing the drop across the latter as is sometimes done. If the clearance between the trolley wire and the bridle wire is great enough to allow for sag in the line, the bridle may be run as shown at *B*, Fig. 2, which illustrates how the drop wire is attached to the guy wire that supports it at the point where it turns to enter the building. If, however, there is not enough clearance to allow the bridle to sag slightly, then a messenger, No. 12 galvanizer iron wire, should be run and the bridle carried over on that, being fastened with clamps, rings or tape.

The same idea shown in Figs. 1 and 2 illustrate a method of bringing in a subscriber's drop wire when it may be impossible to attach it directly to the house.

Another method somewhat similar to both of the above is shown in Fig. 3, in which a subscriber's drop

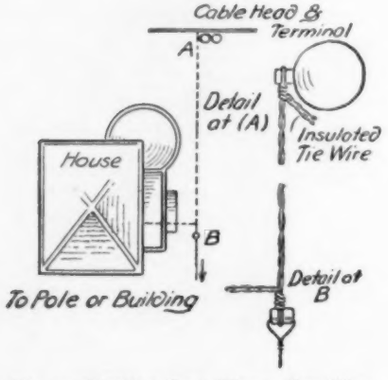


Fig. 2.—Attaching Drop Wire to Guy Wire.

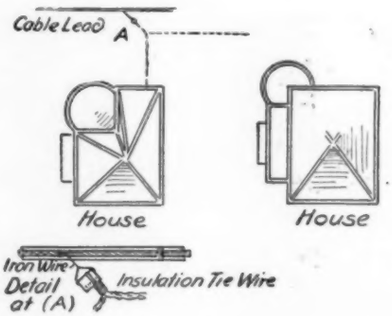


Fig. 3.—Another Way of Bringing in Drop Wires.

wires are brought in without stringing the wire across the property of another party. The detail *A* shows the method of fastening at the corner.

Again, when bringing in two subscribers' drop wires it may be impossible to attach to the front of the building. Then the method shown in Fig. 4 is sometimes used. This method is rather neat and there are cases, even when conditions do not require it, where the drop may be run in in this manner to much better advantage than by attaching to the building.

Telephone-Conversation Timing Device

AN accurate record of the time consumed in long-distance telephone conversation may be obtained by a clocklike device, recently placed on the market, which works on the principles of the stop watch. The device is provided with a minute hand and second hand, and is started and stopped simply by pressing a lever on the left side of the case. It is easily attached to the tele-

Device for Recording Time of Telephone Conversations.

phone or the side of a desk by means of a clip, and carries a pad and a pencil for recording the time.—*Popular Mechanics.*

Loud-Speaking Telephone for Train Dispatching

The telephone has been displacing the telegraph on a number of roads for train dispatching, but one of the drawbacks of this method of communication has been the fact that the operator has had to wear head telephones, which are particularly annoying when there are thunder storms in the vicinity. Recently, L. B. Foley, superintendent of telegraphs of the Delaware, Lackawanna & Western Railroad, has installed loud-speaking telephones on the train-dispatching lines. The receiver,

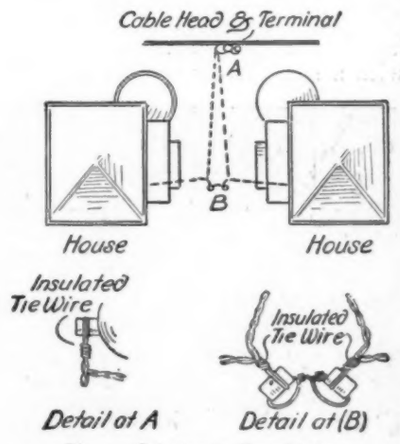


Fig. 4.—Bringing in Two Lines.

which is more sensitive than that ordinarily employed, is furnished with a horn, something like a phonograph horn, and is mounted on the dispatcher's desk at any convenient point, so that he can receive a message without putting his ear to the receiver. The transmitter is also fitted with a horn, into which the operator can speak. No amplifiers are used. With this outfit a message may be heard in all of the loud-speaking receivers on the line within fifteen feet of any one of them, which obviates the necessity of wearing a head set.

Line Interference Considered Legally

Read Before the Iowa Independant Telephone Association—Continued from September Issue

BY HAROLD L. BEYER

WE now come to a group of cases in which relief by way of injunction was not allowed. These are suits by telegraph and telephone companies against street railway companies and one of the controlling principles is that the use of the streets and highways for street railway lines is regarded as one of the fundamental uses of the highway, namely, for the purpose of transportation, and that the use of streets and highways to carry poles and wires of telephone, telegraph and electric light companies is not such a primary use.

In some of these cases the injunction is not allowed where the defendant company files a bond to protect the complainant. If it should be made to appear that the company complained of is insolvent, or will not be able to respond in damages, it is believed that a court of equity would generally grant an injunction to prevent an irreparable damage.

In *East Tennessee Telephone Co. vs. The Knoxville Street Railway Co.*, Chancery court, Knoxville, April, 1890, 3 *Am. Elect. Cas.* 400, the injunction restraining the electric railway company from using either the earth for its return currents or maintaining its wires overhead, was denied, and the same result was reached in *Rocky Mountain Bell Telephone Co. vs. Salt Lake City Railway Co.*, District court of Utah territory, Salt Lake City, July 23, 1889, 3 *Am. Elect. Cas.* 350, in both of which cases the telephone lines had been first established. The court was not satisfied as to the proof of irreparable injury. In the Rocky Mountain Bell case the trolley wires were erected at a distance of eight feet from plaintiff's wires. The court was also of the opinion that the more effective remedy, namely the metallic circuit, was within the power of the plaintiff to adopt and it had not been tried. This was also the ground of the decision in the case of *Cumberland Telephone & Telegraph Co. vs. The United Electric Railway Company*, 93 *Tennessee* 492, 4 *Am. Elect. Cas.* 297, in which it appeared that plaintiff operated a system of grounded telephone lines which rendered satisfactory service until defendant's single trolley street railway system was built and operated. The result of its operation paralyzed plaintiff's system and injured it in the following ways: (1) By conduction or leakage, the effects of which were shown in earth one-half mile each way, the plaintiff having equipped its system with the McCluer device at a cost of $3,660.58, conduction not being the result of or connected with the street use and being caused by the railway companies in not observing the rule of so using its property as not to cause legal damage to the property of others; (2) by induction or parallelism, transposition having been installed by the plaintiff at a cost of $856.30, the court holding that induction must be remedied by the plaintiff since the use of the streets by the street railway is an ordinary use and induction is technically an obstruction thereof by a telephone company; (3) plaintiff expended $816 in erecting higher poles to avoid the effects of this system. Plaintiff's poles occupied one side of the street and defendant's poles were put up on both sides of the street. The court held that the defendant was not liable for the damage caused by induction as that could only be prevented by not locating the trolley system on the streets where plaintiff's wires were placed; that defendant was liable for the damage occurring from the conflict of poles and wires and that defendant was entitled to damages for loss caused by conduction. The court said (page 315):

> The injury by conduction constitutes such invasion or taking of plaintiff's property as renders defendant liable for the damage done. It is a direct and immediate result of defendant's injurious act. It imposes a burden on plaintiff's property that impairs its use and value. The loss is fixed and definite in amount. It can make no difference that no material thing was taken, or that the loss resulted from contact of material things, but through the agency of the subtle and impalpable electric fluid.
>
> The important consideration is that a thing of value has been taken from the plaintiff for the benefit of defendant as the representative of the public, and for that thing compensation must be made. . . . That defendant's act may have been authorized and lawful can make no difference. The legislature has not the power except, perhaps, as to corporate franchises to authorize, and in this case it has not undertaken to authorize, the taking of private property for the public use without compensation.

An injunction suit was tried at an earlier date between these same parties in the U. S. Circuit Court, May 19, 1890, and is reported in 3 *Am. Elect. Cas.* 408, 42 *Fed.* 273, and 12 *L. R. A.* 544, and the injunction was denied on the ground that defendant was using its franchise lawfully and without disregard of plaintiff's rights; that the injury was not the result of defendant's plan of construction and that the plaintiff had a more effective remedy in the installation at plaintiff's expense of the McCluer device, that is a single return wire upon each route disturbed by the railway service, to which each telephone on that route is connected and which operates to complete a metallic circuit. The court deemed it impractical because of the great expense to require the telephone company to install a complete system of metallic circuits, and said that the great number of additional wires required would be "far too numerous for comfort, beauty or safety; also involving more extensive terminal equipment in the central office." These considerations would doubtless not have so much weight with a court today in view of the modern methods of cable and underground construction.

In a leading English case, *National Telephone Co. vs. Baker*, Law reports, 2 Chancery Division, 186, decided 1893, 2 *Am. Elect. Cas.* 320, it was held that the plaintiff telephone company was not entitled to an injunction or damage for injuries to its grounded telephone lines caused by defendant's single trolley system. The court denied the defendant's contention that the plaintiff was under obligation to install the McCluer device, holding that plaintiff was not obliged to protect itself against the unusual current set up by the defendant. It, however, held for the defendant for the reason that its tramway had been constructed under a provisional order confirmed by act of parliament. It is, of course, understood that Great Britain not having a written constitution, an English court cannot hold an act of parliament to be unconstitutional.

In *Nebraska Telephone Co. vs. York Gas & Electric Co.*, 27 *Nebraska* 284, 43 *N. W.* 126, 3 *Am. Elect. Cas.* 364, September 17, 1889, it was held that an electric light company will not be enjoined from stringing its wires so as to interfere with a telephone company where the light company obtained its franchise first.

In the case of *Wisconsin Telephone Company vs. Eau Claire Railway Co. and the Sprague Electric Railway and Motor Co.*, Wisconsin Supreme Court, January 29, 1890, 2 *Am. Elect. Cas.* 383, the telephone company applied for an injunction to restrain the defendants from operating their street railway in the streets of Eau Claire on the ground that the escape of electricity from defendant's trolley wires interfered with the successful operation of plaintiff's telephones, the leakage of such electricity being caused by defendant's failure to install a double trolley system. Plaintiff had a prior franchise and defendant's single trolley system was installed without objection by plaintiff. The Wisconsin statute required all companies transmitting electrical energy "To provide by suitable insulation return wires or other means against injury to persons or property by leakage, escape or induction of any and every current of electricity" and provided that any person or corporation injured thereby might have a preliminary injunction preventing the further use of such current until the insulation devices were installed. It was held that no injunction would lie, that the provisions applied equally to the plaintiff and defendant and that plaintiff's injury resulted from its failure to provide metallic circuits for its telephone lines. The court said (page 386):

> Hence the injury complained of is not irreparable or continuous. When the improvement is made, the trouble complained of will cease, and the plaintiff, if it should be found that this expense so incurred was made necessary by the wrongful act of this defendant, could sue the defendant at law and recover whatever expense was incurred in making the change. I therefore think that if the plaintiff suffered any injury by the acts of the defendant in building or operating their road, it has a complete remedy at law. . . . The principal use of the street is to accommodate the traveling public, and whatever rights the telephone have must be held to be in subordination to this right of travel. . . . This principle applies not only to the mode of travel at the time the telephone was built and their rights acquired, but applies as well to any new and improved modes of travel which may have been or may hereafter be invented and apply generally in aid of public travel on the public streets.

To the same effect is *Cincinnati Inclined Plane Railway Co. vs. The City and Suburban & Telegraph Assn.*, 48 Ohio, 390, 29 *Am. State Reports*, 559; 18 *L. R. A.* 674, 3 *Am. Elect. Cas.* 443, December 2, 1891 and *Hudson River Telephone Company vs. Watervlied Turnpike, etc., Co.*, 31 *Am. St. Rep.* 838; 17 *L. R. A.* 674, 3 *Am. Elect. Cas.* 387, February, 1890.

In *Cincinnati Inclined Plane Ry. Co. vs. Telegraph Association*, 48 *Ohio St.* 390, 29 *Am. St. Rep.* 559, the court said (page 565):

> Conceding that the mode adopted by the railway company of propelling its cars by electricity is an interruption to the telephone service of the defendant in error, and calculated to impair its franchise in the manner contended, the inquiry is suggested whether the railway company must yield up a useful franchise that the same may be exclusively enjoyed by the telegraph association, or whether the association shall adapt its system to existing conditions; whether the company shall change from the single to the double trolley system, from the grounded to the metallic circuit, or whether the association shall use either a complete metallic circuit or resort to the McCluer device. It is immaterial on which party the expense of the change may fall the more heavily; it is a question of legal right: and as remarked by Lord Hatherly, L. C., in *Attorney General v. Colney Hatch Lunatic Asylum*, L. R. 4 *Ch.* 153; "The simplest course as far as regards the administration of justice, is to ascertain the exact state of the law which regulates the relations of parties; and having done so, to proceed to act on it, without any reference to the difficulties of the case on the part of those against whom it is obliged to decide; leaving those parties to relieve themselves as they best can from the position in which they have placed themselves, and if there be no other mode of escape, to cease to do the acts which occasion the wrong.

In State ex rel. *Wisconsin Telephone Co. vs. Janesville Street Railway Co.*, 87 *Wisconsin* 72, 4 *Am. Elect. Cas.* 289, January 30, 1894, the case arose under an ordinance requiring the maintenance of guard wires "whenever it shall be necessary to cross telephone lines," which the defendant had failed to install, it was held that plaintiff was entitled to a writ of mandamus to compel the installation of such guard wires. The court applied the doctrine of *sic utero tuo non alienum laedas*, and took the view that defendant had intruded on the established business of the relator in such a way as to endanger it and the persons engaged in it. The court said (page 292):

> Ought not the defendant to be compelled to adopt the above safeguards to prevent this threatened mischief or to withdraw its lines from the vicinity of the relator's wires? The company that caused the mischief ought to repair it.

In *Central Pennsylvania Telephone & Supply Co. vs. Wilkesbarre & West Side Railway Co., Pennsylvania County Court Records*, 417, 4 *Am. Elect. Cas.* 260, February 8, 1893, the court denied a temporary injunction when the defendant showed that it had put up guard wires so as to prevent actual contact with plaintiff's wires, and upon filing a bond in the sum of $10,000 conditioned to pay all damages for which it might be adjudged liable to plaintiff. The conclusions of the court are thus summarized (page 269):

> 1. An electric street railway is obliged to use all reasonable care and prudence in constructing its system and to adopt useful appliances to prevent contact of its wires with those of a telephone company stretched along or across the same highway.
>
> 2. It is the duty of the telephone company to construct its lines so as not to incommode the public in the use of the highways for purposes of transportation by ordinary vehicles or electrically drawn cars. If the railway company cannot avoid danger of contact by proper construction, it is the duty of the telephone company to change the construction of its lines to accomplish safety, even if it were the prior occupant of the street.
>
> 3. If the danger of contact is due to the negligent manner in which the telephone lines were built, it is not entitled to be indemnified for the cost in making the necessary changes.
>
> 4. If the telephone lines were constructed with due care and regard for the rights of the public in the highways as the highways were commonly used at the time of the telephone lines were constructed, and if plaintiff is entitled to indemnity, the measure of damages which it will sustain would be the cost of making the necessary changes.

In *Simmons vs. The City of Toledo et al.*, 8 *Ohio Circuit Court reports*, 535, 5 *Am. Elect. Cas.* 152, it was held that a *telephone subscriber* is not entitled to an injunction against an electric street railway company on the claim that by reason of defendant's trolley lines in the street the telephone service at plaintiff's house would be interfered with by induction, the danger not being sufficiently clear, either that the service would be impaired or that there was danger of physical injury to the occupants of the house.

A famous English leading case known as *Fletcher vs. Rylands*, 1 *L. R. Exch.* 263, laid down the broad principle that "one who for his own purpose brings upon his land and conducts and keeps thereon things likely to do mischief, if it escapes is prima facie answerable for all the damages which are the natural consequences of its escape."

In *Hudson River Tel. Co. vs. Railway Co.*, 135 *N. Y.* 393, 31 *Am. St. Rep.* 838, appears the following dictum:

> We are not prepared to hold that a person, even in the prosecution of a lawful trade or business, upon his own land, can gather there by artificial means a natural element like electricity, and discharge it in such a volume that, owing to the conductive properties of the earth, it will be conveyed upon the

grounds of his neighbor with such force and to such an extent as to break up his business, or impair the value of his property, and not be held responsible for the resulting injury. The possibilities of the manifold industrial and commercial uses to which electricity may eventually be adapted, and which are even now foreshadowed by the achievements of science, are so great as to lead us to hesitate before declaring an exemption from liability in such a case. It is difficult to see how responsibility is diminished or avoided, because the actor is aided in the accomplishment of the result by a natural law. It is not the operation of the law to which the plaintiff objects, but the projection upon its premises, by unnatural and artificial causes, of an electric current in such a manner and with such intensity as to materially injure its property. It cannot be questioned that one has the right to accumulate water upon his own real property and use it for motive power; but he cannot discharge it there in such quantities that by the action of physical forces, it will inundate his neighbor's lands and destroy his property, and shield himself from liability by the plea that it was not his act, but an inexorable law of nature, that caused the damage. Except where the franchise is to be exercised for the benefit of the public, the corporate character of the aggressor can make no difference. The legislative authority is required to enable it to do business in its corporate form, but such authority carries with it no lawful right to do an act which would be a trespass if done by a private person conducting a like business. If either collects, for pleasure or profit, the subtle and imperceptible electric fluid, there would seem to be no great hardship in imposng upon it, or him, the same duty which is exacted of the owner of the accumulated water-power,—that of providing an artificial conduit for the artificial product, if necessary to prevent injury to others.

It has been attempted to apply this doctrine to electrical interference cases, but the courts have not followed the rule generally in this country, hence in the case *of Lake Shore & Michigan Central* [sic] *Railway Co. vs. Chicago L. S. & S. B. Railway Co.*, 98 *N. E.* 989 (Ind. *App.* 1910), where the railway company sought to enjoin an electrical railroad company operating on its adjacent right of way an electrical railway with wires carrying current of 33,000 volts, which interfered with the operation of its electric signal and telegraph lines, the injunction was denied, the electric company not being guilty of negligence, unskillfulness or malice in the construction and operation of its lines, and the character of appliances to prevent interference not being disclosed, and it not appearing that the railroad company might not, by some inexpensive method, prevent the annoyance complained of. The same conclusion was reached, applying the doctrine of this case in the later Indiana case of *Postal Telegraph & Cable Co. of Indiana vs. Chicago L. S. & S. B. Railway Co.*, Indiana Appellate Court, January 10, 1912, 97 *Northwestern* 20, *Western Union Telegraph Co. vs. Same*, Indiana Appellate Court, January 11, 1912, 97 *Northwestern* 21, and *Citizens Telephone Co. vs. Ft. Wayne & S. Railway Co.*, 100 *Northwestern* 309, Indiana Appellate Court, December 18, 1912.

The same court has also held that an electric company transmitting high voltage currents along the highways is bound to use a high degree of care commensurate with the danger incident to such business (plaintiff not an employe of defendant, was killed by coming into contact with a live wire over which a 5,000-volt current was passing.) *Michigan City Gas & Electrical Co. vs. Dibka*, 100 *Northwestern* 877, February 21, 1913. Our Supreme Court under similar circumstances in *Knowlton vs. Des Moines Edison Light Company*, 117 *Iowa* 451, held that an electric light company must use *reasonable* care to prevent the escape of an electrical current of 2,500 volts from its wires in such a way as to injure persons lawfully within the reach of such danger, which involves the use of a high degree of diligence and foresight in the construction and maintenance of its lines in a safe condition.

As to whether wires located in highways and carrying high voltage currents constitute an additional burden, for which property owners are entitled to compensation, the authorities in this country are in conflict. The cases are collected in notes appended to *Guernsey vs. Northern California Power Co.*, 117 *Pacific* 908, 36 *L. R. A.* (*N. S.*) 185, California Supreme Court, September 8, 1911.

The numerical weight of authority is to the effect that such lines do add an additional burden, and the same holds true of telephone and telegraph lines. See notes to *Hobbs vs. Long Distance Telephone and Telegraph Company*, 41 *Southern* 1003, 7 *L. R. A.* (*N. S.*) 87, Alabama Supreme Court, June 5, 1906; to *Frazier vs. East Tennessee Telephone Company*, 90 *Southwestern* 620, 3 *L. R. A.* (*N. S.*) 323, Tennessee Supreme Court, January 20, 1906.

SUMMARY.

In conclusion, let us attempt to summarize the matters under consideration. Attention has been called to the statutory provisions governing power transmission lines in Iowa, outside of cities and towns, with the danger of conflict, and confusion likely to arise where the numerous boards of supervisors and the railroad commission are given apparently concurrent jurisdiction over the subject of regulating power lines. It is the speakers' opinion that the railroad commission should be vested with exclusive control of these lines. Otherwise there will be set up so many different standards of construuction, operation and supervision as there are counties in the state.

A sharp line of distinction prevails between the cases when telephone and telegraph companies have sought redress against electric light companies and those where the defendant companies have been electric street railways. In th case of solvent street railway defendants no injunction will lie to restrain their operation. The courts regard their use of the highway a primary one. All these utilities, telephone, electric light and street railways are licensees of the public. Priority of franchise and use do not give an exclusive right in the streets and highways.

Some courts, as in Wisconsin and Ohio, have held that a telephone company which has not installed metallic circuits is not entitled to equitable relief. Others have held that the telephone companies should install the McCluer device. As to who shall bear the cost of installing these devices, it was seen in the Canadian case the court compelled the electric light company to remove its poles and wires to the other side of the highway at its own expense. The Wisconsin court said that the expense of building metallic circuits, if occasioned by the wrongful act of the defendant, could be recovered at law by the telephone company. The Tennessee court allowed such recovery for cost of apparatus to avoid effects of conduction but not of induction. As to the evils flowing from induction caused by trolley wires, telephone companies are practically helpless at the present time, unless their lines are metallic or protected by devices like the McCluer device, in other words, unless their own lines are kept up to the highest modern standards of efficiency. When a statute or ordinance requires the installation of guard wires, some may be enforced by injunction or mandamus.

The doctrine of *Fletcher vs. Ryland* has not been extended to electrical interference cases, and the Indiana court has refused to protect telephone lines from results of induction from an electrical railway's current of 33,000 volts in the absence of any showing that the owner of the telephone lines could not inexpensively protect itself against such interference, while at the same time enjoin-

ing upon companies carrying such a powerful current a high degree of care in protecting the public from injury.

All direct and wanton trespasses misconduct, abuse of charter or franchise and failure to comply with the law may be restrained, and probably the direct injury of apparatus or property by escaping electric current is actionable.

The location of wires will be controlled by injunction if necessary, so far as practicable to make possible the operation of two or more franchises. Injunctions have been allowed at the suit of telegraph companies in two cases and once—the Canadian case—in favor of a telephone company against an electric light company.

As to damages caused by induction it would seem, as suggested by Deiser in his work on "Conflicting Uses of Electricity and Electrolysis," that the courts have carried to the limit the doctrine that the railway company, as holding a franchise in furherance of public travel, cannot be held liable; and that this immunity practically gives it a monopoly in the use of the earth as a return circuit. He further suggests that the railway ought to be required to adopt a complete metallic circuit in some way to prevent the escape of electricity from the rails, thus producing comparative equality in the relations of the parties. Interference by induction could then be avoided by placing poles and wires at suitable distances from each other, no cases have been found where the injury complained of was caused by a company operating lines carrying high voltage currents for power purposes only along the highways. Where such lines run out over the country from central stations, such as the one at Keokuk, it should be required that the owner acquire a right of way and fence it so the public runs no chance of coming in contact with the powerful current. In the meantime, it is eminently desirable that the owners of electric properties of all kind should endeavor to establish relations of friendly co-operation and mutual helpfulness to the end that the lines and facilities of each may be properly constructed so as to give the best possible service to the patrons of each utility and at the same time not to inerfere with and injure the property and business of other utilities with which it necessarily comes frequently in contact.

A. T. & T. Revises Expenditures

As a result of conditions growing out of the European war, the American Telephone and Telegraph Company has revised its construction expenditure estimates and is cutting these outlays whenever it can do so without serious detriment to the public service. In the aggregate the reductions already ordered will amount to several millions of dollars. Some classes of outlay are understood to have been cut 40 to 50 per cent.

There is no doubt additional justification for this reduction in construction expenditures because of the fact that the business communities of the country will not need much, if any, additional facilities for the next six months or a year. In fact, in its business services the Bell system has naturally experienced some cancellations.

When the war broke out the American Telephone Company had in its treasury approximately $50,000,000 in cash. This money the Bell officials intend to husband and protect its expenditure with all the wisdom at their command.

When the Bell system arranged its financing early in 1914, the statement was made by President Vail that this concluded the necessity for new financing until the early part of 1916. That meant that all through next year the big company would not have to enter the money market.

The reduction in construction outlays and careful husbanding of treaury resources will carry forward the date when new financing will have to be considered several months. It is not extravagant to assert that as things are now lined up, the American Telephone Company could go for two years without asking the public to buy its securities.

This is an enviable position to occupy. It is a fresh illustration of the remarkable judgment and success which has attended the company's financial administration for the last eight years.

City of Chicago's Telephone Bureau

The employes of the Chicago Telephone Bureau, which is a branch of the Public Service Department, under Commissioner Montague Ferry, organized a Dutch treat club on September 21, 1914. Ray O'Brien was toastmaster for the evening. It was decided to meet semi-monthly to discuss matters of common interest and to promote good fellowship throughout the force.

An interesting talk on "Team Work in a Municipal Department," was made by City Telephone Supervisor G. W. Cummings. The response to this address was so enthusiastic that it was decided to organize a school to study the latest developments in the telephone field from the viewpoint of the public service inspector. The general discussion, which followed, brought out strongly the fact that the telephone using public of Chicago hails with delight any news of the activities of the bureau in guarding the interests of the individual subscriber.

The bureau might be compared favorably to a combined court of appeals and a compromise court, for through its efforts in acting as a disinterested third party, disputes between dissatisfied subscribers and a telephone company are brought to a settlement satisfactorily.

An agreement which will mean the saving of many dollars to telephone subscribers annually has been reached between the Chicago Telephone Company and G. W. Cummings, head of the new telephone bureau.

Hereafter the company will charge only the actual cost of labor and material involved in the transferring of a telephone instrument. The ordinance allows a charge of not more than $5 and the company heretofore has charged full rate in every case.

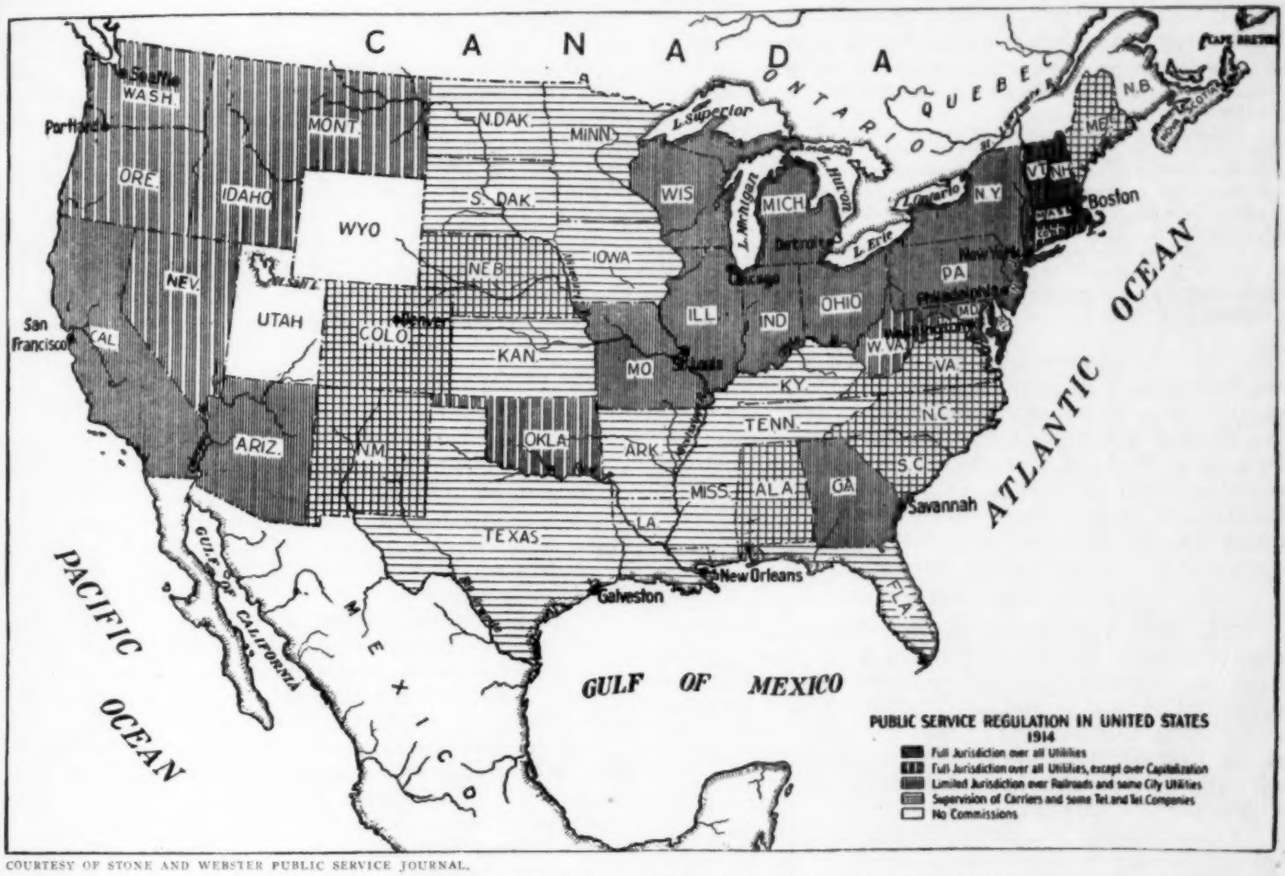
Seven men with stop watches have been assigned by the bureau to make tests of the service given by the company. They obtain records of the length of time required to obtain a number and the number of wrong numbers given.

The newly-installed telephone service in Constantinople was formally opened for general use March 28, but was experimentally in operation from the 4th, when the first subscribers were enrolled. A difficulty of the undertaking has been the instruction of the staff of native women in the duties of telephone operators.

As a result of the recent storm, which tied up railroad service betwen New York and Philadelphia by blowing down telegraph and telephone poles across the tracks, the Pennsylvania railroad has decided to run its telegraph, telephone and signal wires in conduits underground.

Public Utility Commission News

Activities of State Regulating Bodies in the Telephone Field



COURTESY OF STONE AND WEBSTER PUBLIC SERVICE JOURNAL.

Map Showing How Plan of Regulation of Public Utilities by Commission Has Spread.

Ohio

BY order of the Ohio Commission every public utility in the state must, before January 1, make and file with the commission a certified valuation of all its properties. This will be the first complete valuation of the utilities of the entire state ever made. The valuations will be used as a basis for rate-making, condemnation proceedings and the issue of new capital.

The committee selected by the utilities consists of R. R. Stevens, representing the Ohio independent telephone companies; Robert Lindsey, of the Cleveland Electric Illuminating Company, representing the gas and electric companies; Allard Smith, representing the Cleveland Telephone Company; Frank C. Dunbar, representing the Ohio companies of the American Telephone & Telegraph Company, and E. W. Coen, of the Lake Shore Electric Railway, representing the electric railways of Ohio. The members of the committee have been in New York consulting leading public utility engineers and have completed their work. Final sessions of the committee will be in Cleveland.

The cost of making these valuations will be large. It is estimated that it will cost the subsidiaries of the American Telephone & Telegraph Company in Ohio not less than $200,000, and that, on the average, the cost will be not less than 1 per cent of the valuation.

A corps of sixteen telephone experts representing the Ohio Commission have been in Cleveland for some time past, making a valuation of the Cleveland and Cuyahoga Telephone companies. Good progress has been made on the work. It is not expected that a complete report will be ready before December 1.

The Ohio Commission has ordered that the Central District Telephone Company, of Pittsburgh, Pa., and the Harrison and Jefferson Telephone Company, of Cadiz, Harrison county, Ohio, be authorized to form a physical connection between their plants and systems. The companies are ordered to file with the commission schedules of reasonable rates for such interchanged service. The authority granted may be exercised by the companies after such schedules of reasonable rates have been filed with and accepted by the commission.

The Ohio Commission has ordered that the Clinton Telephone Company be authorized to issue five and one-half per cent first mortgage bonds, payable in fifteen years from the date of issue, of the total

principal sum of $50,000, and that said bonds be sold for the highest price obtainable but for not less than the par value thereof, it being the opinion and finding of the commission that the money to be secured by the issue of said bonds is reasonably required for the proper purposes of said corporation. It is ordered that the proceeds arising from the sale of said bonds be devoted to and used for the following purposes:

For the construction and furnishing of a telephone exchange and central office building and wareroom, at Wilmington $20,000.00.

For new exchange equipment, switchboard, terminals and apparatus to be installed in said building; for the purchase of new telephones at said exchange, and for the material and labor necessary for underground cable, and to rebuild, renew and improve the outside construction of said plant at Wilmington, $22,000.00.

For new switchboard and apparatus at the Sabina exchange; to repair and improve the outside construction and add new cable and wire and install new telephones at said exchange, $8,000.00.

The Ohio Commission has authorized the Somerset Telephone Company to lease to the Newark Telephone Company all of its property, as fully set forth in a detailed inventory filed with the commission. The Newark Telephone Company is to pay therefor, as rental, six per cent per annum on a valuation of $22,000 and to assume an indebtedness of $3,000 now owing by the Somerset Telephone Company.

New York

The New York Public Service Commission of the second district has handed down a decision in the long standing complaint of the State Agricultural and Industrial School at Industry, N. Y. This complaint was filed in 1910 and asked that the New York Telephone Comany be compelled to furnish connections with the private switchboard erected and maintained within the institution.

Commissioner Frank Irvine has now written an opinion on which the commission decides the case. He holds that the public necessity, represented by efficient telephone service, takes precedence over the private convenience, even of a public institution which might demand the service asked in the complaint. Says the opinion:

The question must be viewed not solely as one between the telephone company, on the one side, and the individual subscriber seeking private ownership, on the other. The individual subscriber is not the only one interested in his telephone equipment. Every subscriber is interested in the entire service, including the equipment of every other subscriber with whom he has occasion to communicate. The best equipment at one station is of no avail if communication is prevented by defective equipment at the other end of the line. All telephone users, which means practically the entire public, are concerned with the efficiency of the telephone service as a whole.

The public has a right to generally efficient telephone service and it has a right to look to the telephone company for such service and to hold it responsible therefor. Generally efficient telephone service, we believe, would be impossible if subscribers generally owned their own station equipment, buying such as they saw fit and maintaining it as best they could. All responsibility on the part of the telephone company would cease as a practical matter if it maintained only its central offices with wires leading to private installations not of its selection and not under its control. A system of private ownership or a practice of permitting subscribers at their will to install private systems would certainly lead to great deterioration, if not demoralization of the service.

The opinion mentions the contentions of the telephone company that if it owns and controls all instruments it can be held responsible for their maintenance and quick repair through its possession of so large a number of standardized units, whereas were subscribers allowed to furnish their own equipment they might be influenced to purchase cheaper and less efficient ones, possibly injuring the whole system, and certainly less convenient for the subscriber himself to have repaired when out of order.

A further step in the purchase of small telephone companies in the Adirondacks by the Long Lake Telephone Company, hitherto authorized by the New York commission, has been taken in the authorization by that body of an issue of $10,000 of the capital stock of the Long Lake corporation. The stock is to be sold for not less than par and the proceeds are to be used for the purchase and improvement of the lien of Timothy D. Sullivan for $7,395; $600 for the purchase of the lines of E. C. Potter; $500 for the purchase of an automobile truck; and $1,605 for the erection of the comany's proposed line from South Pond to Blue Mountain.

Colorado

The Colorado State Railroad Commission has officially merged with the new State Public Utility Commission and George T. Bradley was appointed by Governor Ammons to serve as the third member, with A. P. Anderson, chairman, and S. S. Kendall. John W. Flintham is secretary.

Under the provisions of the new commission, which extends the powers of the railroad commission to all public utilities, Anderson's term expires January 1, 1915; that of Kendall, January 1, 1917, and Bradley's, January 1, 1919.

Heretofore the railroad commission has had jurisdiction only over steam, electric and express common carriers. Its powers now have been extended to embrace telephone, telegraph, electric, water, light and street railway utilities.

Instead of the rulings of the commission becoming inoperative at the expiration of two years, as at present, under the state utility commission act they remain in effect until modified or set aside by the commission.

The ruling of the commission is law and can be reviewed only by the supreme court on application for a writ of error. The ruling is enforceable pending the review.

The commission is authorized further to investigate any action on its own motion instead of waiting for the filing of complaints by individuals. It has the power to fix rates and compel physical additions and improvements and is empowered to issue summonses for the attendance of witnesses. It may also suspend any schedule of rates filed by a public utility pending investigation of the reasonableness of the reductions.

Nebraska

According to a report filed by Engineer Forbes of the Nebraska Railway Commission with that body, the troubles of the Milburn-Anselmo Telephone Company are almost impossible of settlement. This is a mutual company, in which the town men and the farmers joined in building lines, while everybody bought the kind of telephone he wanted. Internal jealousies and the disregard of business principles

are given by Mr. Forbes as the reason for the poor service and financial conditon. In part the report reads:

The company was organized in 1902 and has been operated as a mutual since that time. The company built the town exchanges and the main lines between exchanges with cash received from the sale of stock. The rural members built the lines for their own service and took stock in the company. All members, town and rural, provided their own telephones. It is expected to serve 600 subscribers, 95 per cent of which are members. The annual rates charged at the outset were $4. The rates have been raised since to $5, $6, $8 and $12, respectively, the latter being in force at the present time.

The property consists of 200 miles of pole and fence line and 500 miles of wire.

I called central from four different telephones on the same line, no two of which were of the same make, and one of these was reported to be at least twenty years old. Central answered each of the calls I made, but was unable to call back.

Some rivalry exists between Merna and Anselmo over the selection of the trouble man. If he happens to live at the latter town, that section of the line demands his first attention and consumes the major portion of his time. If he lives at Merna, the reverse is true. The directors repair the lines of their own district at times when other duties are not too pressing. Trouble calls are seldom answered in less than three days.

In case of insufficient service, the trouble man insists that the difficulty is in the telephone, while the subscriber insists that it is in the transmission lines. This situation results frequently in no action by either party. The average condition of the line is 45 to 50 per cent good. The subscribers claim that present rates are too high for the quality of service rendered and many have refused to pay the additional assessments levied to bring the line up to a better condition.

In conclusion the engineer says the people there are willing to give their stock to someone who will take charge of the line and bring it up to an operative entity.

In the opinion of Mr. Forbes it will take $5,000 to $10,000 to put the line in shape.

The Nebraska Commission after listening to a protest from a committee of Ashland citizens rescinded its recent order which permits the Lincoln Telephone Company to cancel grounded circuit rates and to increase rates for metallic service. It was represented to the commission that 80 per cent of the subscribers desired metallic service.

A. B. Fuller, Glenn Howard, J. B. LaChapelle, J. C. Bryant and E. C. Wiggenhorn are the citizens who called on the commission to protest. It was shown by the committee that farm lines are grounded and that many subscribers did not care to change to metallic service and an increase of rates. The committee charged that the telephone company's agents had, while installing lightning arresters, changed telephones from a grounded circuit to metallic circuit, this being without the knowledge and over the protest of some subscribers. After the company had made the changes in this way, it was alleged it represented to the railway commission that 80 per cent of the subscribers were using the metallic service. The commission issued its order under this showing, subject to protest. The protest came with considerable force. It is likely that the matter will now have to be heard by the commission so that both sides may have an opportunity to give testimony.

Wisconsin

A stay of proceedings has been granted the Wisconsin Telephone Company by the Wisconsin Railroad Commission, in order to give the corporation opportunity to take legal action to estop the enforcement of the order requiring physical connection of toll lines of the company in La Crosse with those of the La Crosse Telephone Company.

The commission on August 20 issued an order requiring the two companies to connect their toll lines inside of ten days, and prescribing the rates which should be paid by subscribers of one company for using the toll lines of the other corporation.

Frank Winter, who asked for the order from the railroad commission, received notification that the Wisconsin Telephone Company had been granted a stay of thirty days by the railroad commission. The time was requested in order to give the company time to take legal action to hold up the order to connect the lines here until the circuit court of Dane county decides the case brought to test the constitutionality of the physical connection law. It is probable an injunction will be asked by the Wisconsin Telephone Company.

Missouri

Citizens of Peirce City, Mo., and vicinity who formed a mutual telephone company to enjoy lower rates than were being furnished by the Missouri and Kansas (Bell) Telephone Company have been turned down by the Missouri Public Service Commission. The commission in its ruling held that the Bell Telephone Company was giving satisfactory service at "reasonable" rates. The citizens who desired to obtain the permission of the commission had obtained a franchise to operate in Peirce City.

The ruling protects the Bell Company at Peirce City against competition and establishes a precedent under the new public service act. Scores of mutual companies, heretofore, have been organized to do purely local business, in many instances to compete with one of the Bell companies.

Feeling that they had been unjustly discriminated against the Peirce City citizens filed a motion for a rehearing, but a rehearing was denied.

California

The Public Utilities Commission of California has recommended that the Pacific Telephone & Telegraph Company and the Home Telephone Company, both of Los Angeles, be consolidated in 1916 so that any telephone user may communicate with any other without being compelled to use separate telephone systems. A consolidation will also eliminate any duplication in equipment which now exists. The commission's annual report dealing with the telephone situation shows that both systems are employed in 3.44 per cent of the residence stations and in 22.5 per cent of the business stations. It also indicates that 56,050 telephones belong to the Home system and 65,159 instruments to the Pacific system. The reason for setting the date of consolidation as 1916 is that the Pacific Telephone & Telegraph Company's franchise expires at that time.

Shares are being placed in Rosario, Argentina, for constructing a network of telephone lines which connect Galvez, Rafaela, Esperanza, Serodino, Irigoyen, Maciel, Caboto, and San Carlos with Rosario.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE history of pay station telephones in Bavaria reaches back to 1899, when the first pay stations were tried out temporarily in Munich. In these telephone booths, the subscriber called the office first, gave his number and did not drop his money into the slot until the connection was made, and the desired party had come to the telephone. The exchange operator had to keep her attention on this call until the answer was given, and then saw to it that the caller dropped the coin into the slot. The coin rolled on two metal rails, which were connected to the microphone battery through the primary coil of the induction coil, to the cash box, thus closing the battery circuit. But as the contact between coin and metal rails was not a very close one, the results were current changes, which caused induction currents in the secondary winding of the induction coil, and thus caused a peculiar noise in the telephone receiver. This strong, buzzing noise was heard in the telephone receiver of the exchange operator, who then would allow the conversation to proceed. If the conversation was begun before the coin was paid, the operator had to request the caller to pay, or, if this was not done, break connections. In 1902 these pay stations were extended, being of a more improved type, and found wide distribution all over Bavaria. There were various disadvantages even in the improved types. Often callers would drop the coin before obtaining the connection or being asked by the operator, and then there would ensue a lengthy conversation between operator and caller, which was very disagreeable. Then some caller discovered the fact that scratching the diaphragm of the receiver would reproduce the buzzing noise which told the operator that the money had been paid, and the result was a general cheating of the company. The apparatus was then improved to give a metallic, acoustic signal to the operator, which was again imitated by callers by means of a metal key, or other instrument striking the telephone bell. Finally, the drawback of having the caller drop the coin after making connections, and on the request of the operator, made the company lose money, in that the operator often forgot to ask for the coin during rush hours or made wrong connections so that the caller could speak without paying. Finally in 1909 the telephone department worked out an improved model, which is here briefly described and has been used since then throughout Bavaria.

In working out the new type instrument, the following points were observed:

1. Payment of toll must take place before making the call, but must be possible only if the entire telephone set is in working order. Any difficulties in operation must be visible to the caller in some way, so that he avoids using that instrument.

2. The possibility of throwing another coin into the slot, after one has been deposited, must be avoided until the operator at the exchange has either made the connection and transferred the money into the cash receptacle, or else has returned the coin through the return channel.

3. Passing the coin to its final place is to be accomplished independent of the caller, and by the exchange operator alone.

4. Operation is to be the same always, whether it is a question of cashing the toll, or of returning the money; there must also be a possibility of testing the entire telephone set at any time through a simple operation.

5. Throwing in coins other than the legal kind must not operate the telephone and the possibility of stealing money from the cash till must be eliminated.

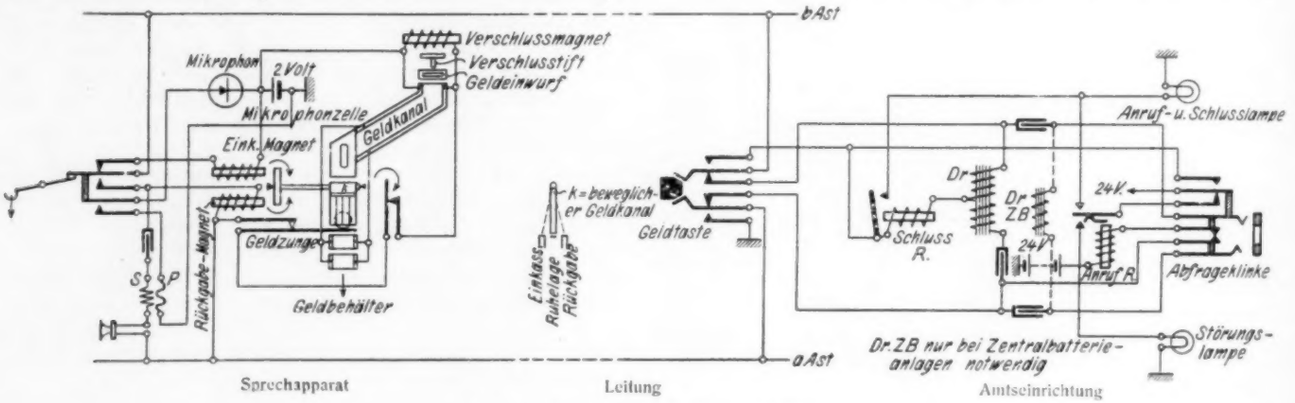


Fig. 1. Pay Station Instrument Diagram.

In the 1909 model, built in accordance with these requirements, the receiving and return of the money is accomplished electrically. Immediately back of the coin slot is a locking device which locks the slot until the money has reached the till or has been returned. The exchange operator operates the money key and either returns or receives the money by a single key movement, depending on whether the toll station receiver is in a hearing or rest position.

The *a*-branch of the loop wire, leading to the pay station telephone, is under continuous current while conversations are interrupted. This current holds the armature of the calling relay in the central position,

and keeps the locking pin of the locking magnet at the toll station in the operating position, and thus feeds the microphone battery continuously. The result is that the armature of the calling relay suppresses the calling signal, and the locking magnet holds the money channel open for insertion of the coin. If the exchange is to be called, a coin must be inserted in the slot, which latter only receives the coin when the instrument is in working conditoin. After the insertion of this coin, the latter passes over a metal glide and a testing device which tests the weight and quality of coin, and rejects spurious ones. The coin falls first on the money tongue (Geldsunze, Fig. 1), remains in the rotating channel in a waiting position, and interrupts the closed circuit and the current which flows through the line during pauses between conversations. Result: The calling relay and the locking magnet release their armatures. The call lamp lights up, and the slot for the coin is locked automatically. The operator receives the call, after the caller has removed the receiver, and thus extinguishes her lamp. If the call cannot be made, or if the subscriber is not in, the operator presses the money key and the money is returned to the caller. The working of this key has the result that the 24 volt battery by sending a current over both branches of the telephone line excites the return-money magnet at the pay station and the armature of this magnet is turned down towards the rotating money channel, mentioned before. The money passes to the return channel, the caller hangs up his receiver, and the operators returns the entire system to the rest position by removing her plugs. When the caller hangs up his receiver, the signal lamp at the exchange lights up and the operator pushes down the coin key. By sending a current impulse over the *b*-branch, the cash receiving magnet is excited. The armature of this magnet pushes the money channel forward out of its rest position. The money falls into the till, if the call has been made, and the money tongue closes the rest contact. Upon the subsequent removal of the plug out of the jack the pay station is put in a position to receive another coin. The pressure of the money button therefore operates both the receiving and the return action in the same manner. It returns the money if the call is not made, and receives the money if the call has been made, and the receiver has been hung up again. The call signal lamp notifies the operator of the position of the receiver hook. With lamp lighted, the operator receives the coin; with lamp dark, she returns the money. If the operator forgets to press the money button, then the pay station remains locked and it is impossible to insert a coin in the slot, even if the operator pulls the plugs. This condition shows at her switchboard in the lighting of the call lamp, when removing the answering plug. To release the telephone in this case, the operator has to insert the inquiry plug into the proper jack and then push down the money button and open the coin slot for service.

At the exchange, the introduction of this type of pay station requires special strips, containing the answering jacks, call and trouble lamps, the money buttons, the calling relays, the clearing relay, the choke coils and condensers. All these various details can be connected either at the regular switchboard or else in a separate board. With common battery systems, a 1000-ohm choke coil must be added. Where the pay station service is rather heavy, it is advisable to have a separate switchboard for this kind of calls, as is done in Munich, where switchboards for six operators each operate 140 pay stations. In order to adjust the service to the variations in traffic, the following arrangement has been made: The central operator's place at the first switchboard contains aside from the proper answering, call and trouble lamps, all of the answering jacks and call lamps of the second switchboard wired in parallel. The second switchboard has a rocking key, which permits the transferring of all the call lamps of the second switchboard to the central operator's place on the first board. In this way it is possible to serve both boards with either one or six operators. A further device gives the operator a flicker lamp signal, when five minutes conversation is up. All relays, condensers and choke coils are in the switchboards; the time signals on a separate bracket. For the operation of pay stations, batteries of 24 volts are required. The battery is connected to a good ground connection and to the cable lead covering. The latter are used to obtain complete metallic return circuits. Current distribution by the three wire system is supposed to relieve the strain on the earth return circuit or the metallic return circuit, and care is taken to connect these pay stations alternately to +24 and —24 volt circuits. The use of cable lead sheaths offers a permanent metallic connection of these lead coverings with the battery. To test for a metallic closed return circuit a voltmeter with a current source of 0.5 volt e. m. f. is used, and the voltage loss noted. To protect the wires at the pay station from injury, these are laid in Peschel pipes or flexible metal tubing. These same pipes are also used for the wires to the microphone cell, which is placed in a separate battery case. During intervals between conversations, this cell is fed by common battery current from the *a*-branch. It is therefore important to connect the poles of the cell properly; the positive pole of the common battery to the positive plate of the cell, the negative pole with the negative plate. The positive plate of the cell is recognized by its brown color, the negative by its gray color. The direction of current is determined by litmus paper. If the moist litmus paper is brought in contact with the ends of the current carrying wires, the paper will turn red at the negative end of the wire leading to the negative pole of the battery.

In general the instruments have been constructed so that operation and coin insertion is impossible if the instrument is out of order.

1. Grounding of the *a*-branch; result at the exchange: The calling relay attracts its armature up to the working contact, due to the increase of current strength. The trouble lamp lights. After plugging the inquiry jack, the lamp goes out and the clearing signal lights up. When removing the plug, the first lamp lights again. At the pay station the locking magnet releases its armature and thus locks the slot for the coin.

2. Grounding in the *b*-line: During rest position there is no visible effect at either exchange or pay station. If the pay station receiver is removed, the clearing signal shows at once at the exchange when the operator answers. The receiving magnet cannot be released after completed call, the coin remains on the interrupting lever and breaks the continuous cur-

rent circuit in the *a*-line. The call relay releases its armature, the call lamp lights and cannot be extinguished. There can be no further call.

3. Contact between *a*- and *b*-lines: At the exchange the call relay attracts its armature to the operating position and the trouble lamp lights. After inserting the inquiry plug, the trouble lamp goes out and the clearing lamp lights. After removing the plug, the trouble lamp lights again. At the pay station, the coin receiving magnet is attracted. Through this, the safety contact with the locking magnet is interrupted, the current is interrupted, and the coin slot is locked.

4. Interrupting *a*-branch: At the exchange the calling relay releases its armature and the call lamp lights. Using the inquiry plug extinguishes this lamp and lights the clearing signal lamp. After removing this plug, the call lamp lights again. At the pay station, the locking magnet releases its armature and locks the coin slot.

5. Interruption of *b*-line: There is no effect when there are no calls. The exchange can be called by the pay station, but there is no possibility of conversation between caller and operator. The coin cannot be returned either. Consequently the *a*-line at the money switch remains broken and the call signal appears. At the pay station the money slot is locked.

6. The coin remains caught in the money channel: If either the coin is caught in the coin slot, or the coin till is full so that the money is held in the money channel, or the return channel is stopped up from the outside, the money short circuits the locking magnet, so that: (*a*) at the exchange the call relay attracts its armature and lights up the trouble lamp; and (*b*) at the pay station the locking magnet releases its armature and locks the coin slot.

The working of these pay stations in Bavaria, and especially in Munich, has been excellent. In 1912 Bavaria, which is not a very large country and has comparatively few large cities, had 217 of these new model pay stations in operation, with a total of 1,255,000 calls in 1912. This gives an average per station of 5,780 calls. In Munich records show that 39 such stations had a total of 10,000 to 20,000 calls per year, 7 a total of 20,000 to 30,000, and 2 a total of over 30,000 calls, which shows up very well for the conditions in Bavaria.—*Telegraphen u. Fernsprech Technik.*

DETERMINATION OF BATTERY UNITS FOR CLOSED CIRCUIT CURRENT OPERATION.

IN MEASURING the current strengths in closed current circuits, it is often found that they differ considerably from the standard measurements of 13 milliamperes with series system, and 25 milliamperes with parallel system. The causes for this difference may be in some cases remedied by use of storage batteries instead of copper cells; partial substitution of iron wire for hard copper or bronze wire and proper wiring of electromagnetic cells. In the case of Morse instruments, which the author has taken as a basis for his observations, the total number of copper cells needed for the series wiring of the electromagnetic coils of the Morse instruments is estimated, by allowing for every 5 km. (3 miles) one element, and for every set of telegraph instruments, nine cells. When parallel system is used, three elements are allowed for every 8 km. (5 miles) and for every set of instruments on the line, six elements. If, for example, the line is 80 km. long (50 miles) and has six telegraph stations, and the line uses 4 mm. iron wire, then, with copper cells, we need with series diagram 70 cells and with parallel diagram 66 cells. The resistance of the entire line, if we allow for each set either 630 or 180 ohms and 11 hms for each kilometer wire and 8 ohms for each copper element, will then be: (*a*) with series wired coils= 6.630+80.11+70.8=5220 ohms, and with parallel coils =6.180+80.11+66.8=248 ohms. This gives a current strength for series wired electromagnetic coils of 70: 5220=0.0134 amperes and for parallel coils a strength of 66:2488=0.0266 amperes. If the battery is not made up of copper cells alone, but at the main stations of each 20 volt batteries with a resistance of each 20 ohms, then the size of the batteries with series coils will be 30 copper elements plus 2.20 volt storage batteries, and with series wires coils, 26 copper elements plus 2.20 volt storage batteries. Consequently the resistance of the total line with series wired coils will be 4940 ohms and with parallel wired coils 2208 ohms. In this way the current strength increases with series arrangement to 70:4940=0.0142 amperes and with parallel systems to 66:2208=0.0299 amperes. If we assume the case that the line for its entire length is made up of 2 mm. bronze wire, with a resistance of 6 ohms per km. (⅝ mile) then the resistance of the entire line, using storage battery operation at the end stations, will be for service wiring 4540 ohms, and for parallel wiring, 1808 ohms, making the current strength rise in the first case to 0.0157 amperes and in the second case to 0.0365 amperes.

Improved service could be obtained by testing the current strength regularly every six weeks, when recharging batteries. The time that is consumed by this operation is so low, when compared to the favorable results, that it is negligible. If measurements show that there are more than 14 milliameperes in the line using series wired electromagnetic coils, and more than 27 milliamperes with parallel coils, the battery strength is to be reduced. An easy way to obtain a measure for the reduction in current strength, is to measure the current strength twice with the standard instruments, first when using the standard battery, and then after reducing the strength at the concentrator by 10 or 20 volts. As a rule it will be possible to get a ground connection at the end station instead of connection to a battery. If, for example, the battery at the end station has 20 volts, and the standard battery current strength is 29.6 milliamperes, this shows that a reduction of the battery strength by 20 volts is equivalent to a current reduction of 6.4 milliamperes. Since the current strength in the line is only 3.6 milliamperes to high, the current reduction need only be equal to: 6.4:3.6=20:*x*, from which we get $x = \frac{3.6.20}{6.4}$ =11.3 volts. The battery would therefore have to be reduced by that voltage or 11 copper cells. It need hardly be said, that in the opposite case, if the current strength is found too low, that all resistance on instruments should be tested and the remedy then applied after the fault has been discovered.—*Telegraphen u. Frensprechtechnik.*

USE OF FLUORIDES FOR PRESERVATION OF TELEPHONE POLES.

THE use of fluorides and their salts for the destruction of fungi and similar destructive growths was made public some time around 1880 by the experiments of Professor Effront in Brussels, who used fluor-

ides in his distilleries to stop the action of bacteria. The merit of applying fluorides to the use of wood preservation belongs to an Austrian engineer, Malenkovic, who investigated the preserving action of the fluoride salts on various species of wood. The government then began its tests with poles preserved by fluorides in 1905 and started a more extensive campaign to this end in 1907. The tests were carried on in three directions, using the method of saturating fresh poles with the fluoride, saturating the pole by soaking in the fluorides, and by the vacuum tank process. The use of the fluorides was also to clear up the question of substituting some more effective salt for the copper sulphate. It had been found that the Boucherie process did not offer sufficient protection for the poles and did not attack the fungi enough, so that tests with a salt whose action was five times as strong as that of copper sulphate or zinc chloride was of great importance. In hotter climates it is also advantageous to use poles that are not soaked in tar preservatives, which sweat out in the hot weather, but by a more durable metallic salt. Some of the results will be given in abstracted form:

The first tests made some years ago dealt with air-dried shaved pine and larch poles, whose lower end was soaked for several days in a solution of a zinc fluoride solution. This was obtained by dissolving zinc waste in free hydrofluoric acid, which also shows antiseptic powers. For test conditions a region was chosen which was very much exposed to the growth of fungi. The observations lasted from 1906 to 1913. In all cases the superiority of the fluoride treatment was apparent. Even zinc chloride allows greater destruction than the fluoride. After 7 years time, the destruction of the fluoride poles amounted to only 0.3 to 0.25 of that of the Boucherie process. In a four-year test undertaken, the fluoride poles showed no destructive results, while the copper sulphate poles showed 30 per cent loss. Poles creosoted by the Rutger process, with 100 kg. oil per cubicmeter wood, gave very good results, and needed no replacement even after seven years' time. Since 1907 several thousand poles have been impregnated each year at government and private stations. The following fluoride solutions are used: Acidic zinc fluoride in an aqueous solution for impregnation in concentrations of 3.7 to 6.5 per cent salt contents; the same combination with 2.4-2.7 per cent salt percentage, when using the Boucherie process. As the acidic qualities of the hydrofluoric acid attacked the Boucherie apparatus, neutral fluorides were later used. A liquid was then used made up of a mixture of 1.75 per cent of zinc chloride and 1.75 per cent sodium fluoride solution, using the Malenkovic process, which resulted in the production of almost insoluble zinc fluorides in the wood. In making the tests in some cases, the conditions were made even more severe by setting the pole ends in pits which were filled with saw dust and shavings, which aid in the formation of fungi. A series of 85 poles, mostly short lengths, were observed for investigation. Some of these poles were dried, some were fresh timber. All sorts of preservation systems were used. All of the poles were set out in 1909 and examined finally in 1913. Some had been attacked so violently that under actual operating conditions they would have required exchanging to avoid accidents through falls. The poles attacked the most were naturally the pines that had not been impregnated at all. Next came those impregnated with copper sulphate and zinc chloride. Some of the pole ends were so corroded that they fell over with very little lateral pressure. The poles saturated with fluorides showed better results. Only those that had not been soaked a sufficiently long time showed up poorly. Forty-four per cent of the poles preserved with fluorides showed no attack at all. The earth in the test district is sandy and moist so that there was enough chance for the formation of fungi. In the case of fir trees which do not permit thorough saturation with the tar oils, the government uses a combination process of tar oil soaking, and then saturation of the end with the fluoride. The cost of the process is not excessive, as the sodium fluoride and the zinc chloride are cheap. Further tests are being made to see what influence a ground having a good deal of lime and calcium has on the poles, since the lime might change the fluorides into an insoluble and ineffective compound.—*Zeit. f. angew. Chemie.*

LONG DISTANCE TELEPHONY.

A BERLIN paper brings a news item, stating that an Italian inventor is perfecting a telephone instrument which allows conversations when using a resistance similar to that used in a 35,000 km. line. In the laboratory communication with this telephone was possible, whereas the ordinary telephone naturally would not respond through such a resistance. If Musso's telephone is at all practicable it would mean an enormous saving, if it can be used with the ordinary cables, and would allow the telephone companies to dispense with the expensive Pupin coils. Musso adds that his telephone can work on the same wires with the telegraph, which, if true, would permit the use of the submarine cables without further changes.

Telephone Disinfecting: The German department of telephones and telegraphs recently issued its annual report in which the question of danger of disease transmission by telephone was discussed. It was stated that this danger was practically negligible, but the department was going to begin a disinfecting service, which was to extend to all the state owned telephone instruments in the state. These are going to be disinfected once a year by a special department inspector. Where business men desire to have their telephones disinfected regularly, as might be the case in certain places, the service is given weekly at a rate of $1.10 per quarter per telephone set or switchboard, and 50 cents for each additional telephone set.

Telephone Legal Question: Quite a long time ago, a case came up in Berlin, in which the telephone was removed from a lawyer's office, as he had called the telephone operator by a name usually applied to a certain type of animal. She objected to this compliment, reported the subscriber, and the matter was brought up in the courts, who decided that the telephone department had a right to remove the telephone. The lawyer appealed, and finally the matter was adjusted by re-installing the telephone, but not permitting him personally to use it. He violated this agreement by speaking to another caller, and added to it some more trouble by calling the operator a camel, which cost him a second disconnection of the telephone. He returned the compliment by suing the department for $1,200 damages, claiming that he had not insulted the operator and that the department had no right in the first place to disconnect his telephone.

The court finally denied his suit, stating that the department was permitted by statutes to remove the telephone of any subscriber who acted discourteously or abused the telephone. They also held that his claim that he had not insulted the operator was contradicted by the word of the operator under oath, that the plaintiff had used the term "camel," and that his own witensses merely swore that they had not heard him use that term, which might easily be the case, if they were not present near him, when the conversation took place. The courts held, moreover, that the statute regarding the removal was not a hardship, as this was the first case when a telephone had been removed, although it stands to reason that there must occur numerous other cases where this action might be justified.

Consulting Telephone Engineer: Dr. Karl Scheibe, a Hamburg consulting engineer, gave a very interesting lecture on the question of the need of a special consulting engineer for telephone and telegraph work. The speaker has been a telephone consulting engineer for four years, and frequently heard the opinion expressed that telephony was too small a field for a man to devote all his time to, and to specialize in. To disprove this general opinion, he quoted some of the big telephone installations on which he worked, and whose design and introduction he superintended. Within the last two years, he handled the telephone instalations of fourteen large firms, including banking houses, hospitals, office buildings, steamship lines, etc., the total amount invested adding up to $116,000. These plants were in Hamburg alone, and those installed in other German towns brought the total up to $180,000. Berlin, which would be a fertile field for such a consulting engineer, would offer double that amount, and the total receipts from telephone tolls and incomes would add up to $2,500,000 per year. On the modern ocean liner, the telephone and signal installations alone added up to $200,000. The question is now, as to the influence of the consulting telephone engineer on his clients and on the telephone work. The influences may be divided into (1) a technical one, and (2) a financial one. How great an importance the specialist would have technically, can be seen from the fact that the city of Hamburg has retained the services of a telephone specialist whose work is to superintend and design and consult on all the state telephone installations in the city. The result has been that the telephone installations in the city have for the first time received the attention that they deserve and have been designed with the most modern viewpoints and the greatest efficiency. The new city hospital was designed with an eye to future efficiency and life for decades to come. But when it came to carry out the engineer's recommendations, it was found that the city budget was not sufficient and did not allow for the effective equipment that he proposed, and finally the telephone instruments were offered to the lowest bidder. The same is true in general in the construction of new buildings. The architects request a telephone company or often some member of the engineering staff to work out a scheme for telephones, and the plans are then adopted. Sometimes they are good, often they are bad; but in either case the architect has to pay a high price for his commodity. A typical example may illustrate the case: A Hamburg bank had a telephone system installed in the new building quoted at $7,500. A Dresden bank, which retained the services of the telephone engineer as consulting engineer, installed a similar but superior plant for $4,000. The latter plant is much larger, and is more modern. The Dresden bank uses the line selector system, two wire, with common battery microphone feed system, while the more expensive Hamburg bank uses the older single wire system with microphine feed by means of local batteries at each telehone instrument. The Dresden bank moreover has an acoustic system, whereby every telephone that calls another telephone already busy, is given an acoustic signal, notifying it that the desired line is busy. Finally, the Dresden bank building was a reconstructed building, and the installation had to be done at night under difficulties, while the Hamburg building was a new one and the telephone plant was installed under favorable conditions.

In another case, a Hamburg house had an automatic telephone system installed, which was quoted at $10,000. A similar, but larger automatic telephone plant installed in another city cost only $8,000 and was about 30 per cent larger than the other plant. Moreover the cheaper plant had all the cables in flexible metal tubing, while the Hamburg plant used ordinary gutta percha cables in plain iron pipes. These are only a few instances showing that there is room for improvement and that an expert is able to save a good deal of many for his firm.

One disadvantage has made itself felt, not for the firms retaining the engineer but for the factories turning out the telephone instruments, in that their profits were not as great. Under the other system they worked with a high percentage of profit, while now it has been reduced by a certain amount, although not enough to make them lose any money. The numerous telephone plants instaled without the aid of an expert telephone engineer show a great weakness not only in material, but also in poor choice of location for the various instruments. The result has been that the business of private telephone manufacturing companies has suf houses change to the government-owned telephone fered severely, and that more and more business service and equipment. For example only recently the Hamburg offices of the Hamburg-America Line have given the contract to the German government telephone department to install their instruments and to remove all of the older private telephone equipment now in use. If a private company had been able to meet the requirements and safisfy the Hamburg-America Line as to the efficiency of its equipment, there is no doubt the contract would have gone to the private company. This could have been accomplished with the aid of a consulting engineer, whose business was telepone engineering, and who consequently was an expert in that line, with authoritative views on telephones. There is need and place for telephone consulting engineers, for they benefit the telephone instrument manufacturers by returning to them business that they stand in danger of losing; they benefit the consumers in that they save money for them and give them an up-to-date and efficient equipment; they benefit the telephone industry in general in that they place the equipments installed on a higher level and remove all grounds of criticisms for poor material and inefficiency.—*Zeit. f. Schwachstrom.*

The Law and the Telephone

How Telephone and Other Public Utility Matters Are Treated in the Courts

BY E. J. WENNER

THE case of Ashbach v. Iowa Telephone Company (Iowa) 146 *Northwestern Reporter*, 441, is a recent case touching upon the question of negligence and contributory negligence in the case of an injury to a child in the swinging of telephone cables.

In order that the facts and the application of the law may be fully understood I quote at considerable length from the opinion of the Supreme Court of the State of Iowa as follows:

The defendant, the Iowa Telephone Company, having for the purposes of this case the right to occupy the streets of the city of Des Moines, was on the 23d day of February, 1912, engaged in stringing large lead cables or conduits to the cross-arms of telephone poles on College avenue, in said city. At the time of the accident in question, it was at work stringing these cables within a block of what is known as the Henry Sabin public school and kindergarten, which large numbers of small children attended. Plaintiff was one of the attendants at this school, and at the time he received his injuries was seven years of age.

The cable which the defendant was stringing was slowly unwound from a large spool, anchored in the street, and to the end of the cable a large rope was attached which ran up to a pulley fastened upon one of the cross-arms of the telephone pole, thence through a series of like pulleys to other cross-arms, and finally to the base of a telephone pole standing in the parking between the sidewalk and the curb, on the south side of College avenue, at the alley between what is known as Third and Fourth streets. At the base of the last pole above described was a large pulley, called a "snatch block," through which the rope attached to the cable ran, and a team was attached to the end of the rope after it passed through the snatch block. When the horses attached to the rope were driven forward along the street, the rope was made taut and, passing through the different pulleys, drew the cable up to the cross-arms for fastening.

No guard of any kind was used to keep children or others away from this appliance, and, as we shall see, no person was stationed at or near it at the time of the accident.

The pulley was within but a few feet of the sidewalk, and also close to the alley. At the close of school which plaintiff was attending, he, with several of his schoolmates, started for his home, and passed along the sidewalk on the south side of College avenue until they came to the snatch block, and observing it in motion, and that the team was being driven to raise the cable into position, they stopped, and several of the children, including plaintiff, stepped onto the parking and caught hold of the rope as it passed into the pulley, for the purpose of "helping the horses pull." Plaintiff had hold of the rope nearest the pulley, and at that particular moment the rope suddenly jerked, and plaintiff's hands were both drawn into the pulley. The two middle fingers of his right hand were pulled out, and with them the tendons running up into the forearm, and both hands were badly cut, bruised, and injured. It also appears that another group of children passed by this appliance shortly before the one of which plaintiff was a part, reached there, and one of defendant's employes testified that he had worked this group.

At the time plaintiff received his injuries, there were no men within a half a block of the group of children to which he belonged, and a jury was justified in finding that no warning was given to the group to which plaintiff belonged.

A comparison of instructions given with those asked clearly indicates the difference between counsel as to the main proposition of law in the case. True, counsel for appellant strenuously insist that the plaintiff was guilty of contributory negligence as a matter of law.

[1] But, as plaintiff was but seven years of age, we are not justified in saying, as a matter of law, that he was guilty of contributory negligence. This is an elementary proposition, for which no authorities need be cited.

[2] II. Defendant also claims that the plaintiff was a tresspasser, and that defendant owed him no duty until his peril was discovered, and then at most but the use of ordinary care. As to this the court correctly instructed that neither party was a tresspasser upon the street, and that each had an equal right thereto. As to the mere presence of the parties on the street, this was undoubtedly a correct proposition of law. Defendant simply had a license to use the street for the purpose of doing its work, and the child was not a trespasser because it in play, or otherwise, stepped off the sidewalk and onto the parking, or even into the street.

[3] It is true that in a sense the boy was a trespasser in taking hold of the rope, which he said he did to aid the horses in pulling; but this in itself is not sufficient to defeat the action. If dependant was at fault in operating such an appliance without any warning, barricade, or guard, because it was of such a nature as to attract young children which it knew were passing that particular point, and if in fact it knew, as the testimony tends to show, that young children rightly upon the street were in fact attracted by the appearance and through curiosity or otherwise were led to take hold of the ropes or to play with the pulley the doctrine of there being no duty to trespassers does not apply in its full force if at all. The attractive character of the appliance, the fact that it did, just before the accident, attract other children, the fact that the defendant's employes did warn other children away, and then, although with knowledge that many other children were passing along the street on their way home from school, left the place unguarded, went half a block away, and gave the matter no further attention, creates an exception to the rule that the children were trespassers to whom the defendant owed no duty.

The attractive character of the appliance was such, as some of the cases put it, as to create an implied invitation to the children to use or put their hands upon it. Or, as other cases put it, the negligence of the defendant was the primary and proximate cause of the injury, and the trespass the secondary or remote cause, and in either event, if defendant was negligent, the technical trespass of the child does not defeat recovery.

[4] III. The whole case turns, as we view it, upon the one proposition, to-wit: Was there testimony from which a jury might have found that defendant was negligent?

[5, 6] While defendant had the right to use the street and the appliances that it did, it was bound in law to the exercise of ordinary and usual care in the handling thereof, and what amounts to such care is generally a jury question. What it might do in the country and along public highways does not necessarily give it license to do the same at or near a schoolhouse, where children are likely to be passing in numbers at certain hours of the day. It might, as we understand it, have attached the snatch block so high that children could not have reached it. It might, during the time children were due to pass, have stationed guards to keep them away from the dangerous pulley. It might also have erected a barricade around the pulley so as to have kept children away from it. It was a mere license upon the street, having no absolute right thereon, and was bound to so use its privilege as not to harm others who had the same rights there which it had; and it was also bound to take into account the known habits and customs of children and of their propensities to play with or put their hands upon the appliance. All these things, as a reasonable and prudent person, it was bound to take into account.

A very potent and significant fact in the case is that defendant's employes were actually warned, but a few minutes before the accident, that the appliance with which they were working was attractive to children, and they had warned them away; but, having done this with one group, they went half a block away, without leaving any guard or giving any alarm, and allowed or permitted other children to get hold of the rope, and one of them was injured, as stated.

It seems to us that, when it is once conceded that defendant was a mere licensee upon the street, the children had an equal right thereon, and that defendant knew of the attractiveness of the appliance, from actual experience, that the case is very much stronger than the so-called "turntable" cases, which we have followed and approved as a rule for this state. See Edgington v. Railroad, 116 *Iowa*, 410, 90 *N. W.* 95, 57 *L. R. A.* 561; Fishburn v. Railroad Co. 127 *Iowa*, 483, 103 *N. W.* 481. It is not like those cases relied upon by the appellant, where the defendant was in the use of its own appliances upon its own premises, to which it

had an absolute right, and was not advised that children might be attracted by some piece of machinery or some appliance, as in Hart v. Brick Co., 154 *Iowa*, 741, 135 *N. W.* 423, 38 *L. R. A.* (*N. S.*) 1173; Wood v. Ind. Dist., 44 *Iowa*, 27; Brown v. Canning Co., 132 *Iowa*, 631, 110 *N. W.* 12; Anderson v. Railroad, 150 *Iowa*, 465, 130 *N. W.* 391; Cavanaugh v. Coal Co., 131 *Iowa*, 700, 109 *N. W.* 303, 7 *L. R. A.* (*N. S.*) 907; and other like cases relied upon by appellant

Whilst the case is close in its facts, and may be said to be on the border line, we think the weight of authority, especially of the recent cases, and the application of what are now regarded as well-settled principles, calls for an affirmance of the judgment.

It is therefore affirmed.

English Papers Install Special Service

A new relation between newspapers and the public has developed in London, on account of the war. It is a relation that could not have existed a few years ago, being made possible only by the recent spread of telephone service.

All newspapers, in England as well as in this country, have made it a practice to answer questions asked by telephone relative to important news developments. In any city in the United States the calls upon an editorial room for information as to an event of wide public interest, such, for instance, as a ball game, a closely contested election or an important piece of pending legislation, have always been many. Newspapers have taken it for granted that the requests for information should be answered, and have often put in extra wires and assigned a number of men to reply to telephone calls, in order to serve the public. The same situation has existed between English newspapers and their friends. The fact that replying to telephone questions means, to a certain extent, a competition with the news sales of the newspapers has never been considered either here or in London. Papers have endeavored to satisfy the public curiosity with courtesy and promptness, even though it has often cost them considerable sums of money and tied up telephone lines that were needed for the gathering of news.

In London all this has been changed by the present war. So many people desired to know the latest news at all hours of the day and night that the newspapers found themselves swamped. The *Times* established seven special wires with special attendants for the sole purpose of giving information, and in a day or two discovered that it would need seven times seven if it were to keep up with the demand for bulletins. Its telephone service for news gathering was completely crippled; the members of its staff and those having business with the newspaper were usually unable to get a wire.

So the *Times* announced an innovation and other newspapers have followed. For a guinea a week—about $5—the *Times* will call up subscribers at their residences or places of business, as they prefer and give them all the news of the war as fast as it is received from its correspondents or the news associations. For two shillings—about 50 cents—a message, the paper undertakes to send twenty-four words to anyone in the United Kingdom, who arranges to have this done and makes the proper deposit to cover telephone or telegraph tolls. Outside of this service, it declines to furnish news, except by means of the paper. Those who want to know what is going on may either pay especially for the service or wait until the paper is on the street and then buy a copy.

The telephone officials were as badly overworked as the newspapers before this change in service was made. It must have seemed to them as though everybody in London was calling the same numbers, and those the numbers of the newspaper lines.

Only an emergency like the present in London could have brought about so radical a change without protest. As it stands, the English people are reported to appreciate the situation and agree that the newspapers are justified in charging for information which they can gather and disseminate only at great cost.

Call Street Numbers for Telephone Numbers

"Is this 999? * * * It is, well is Mr. Blank there? * * * He doesn't? * * * Why the telephone directory says 999 is his number. * * * Well, it does look as if these numbers should be listed correctly."

That's one side of the conversation that goes over the telephone wires at frequent intervals, and after those who insist that the book has it all doped out wrong only to be informed that they had better take another look they usually find on close inspection that Mr. Blank lives at 999 Certain street, and that his telephone number is 11111. But they don't find it out until the person whose telephone number is 999 is worried and is wondering why it is that some people are so lacking in intelligence.

This mistake is said to be peculiar to Asheville, N. C., and persons who have been worried by the constant calls of careless individuals who select the street number for the telephone number are unable to account for the fact that so many mistakes of this kind are recorded daily. The telephone company has revised its directories with a hope of getting the street numbers so far from the telephone numbers that there will be no cause for trouble. But the confusion continues.

Instead of using the numbers for the benefit of those dense subscribers who can't distinguish between telephone and street numbers, it has been suggested that code words be used. Under this arrangement, one man has remarked, a subscriber instead of calling for the fire department by asking for 1,000, might ask central to kindly connect him with "extinguisher," while the suffering individual who craved converse with his physician, might pull down his receiver in a hurry to ask for "first-aid." The suggestion was received with some interest when the argument was shattered by an attentive listener who hadn't said anything. "Aw, that would never do," he chimed, "they'd mix up the words. Every man who's calling street numbers now, would then call street names. They'd be asking for Broadway, Montford and Merrimon." And, the fellow who thought he had the question solved, admitted that he didn't know much about the matter.

South Has Decrease in Tolls

Colonel W. T. Gentry, Atlanta, president of the Southern Bell Telephone & Telegraph Company, inspected the properties of the organization in Atlanta before going to New York, where he was called on a business conference. He was pleased with the progress on the annex to the exchange building and not greatly alarmed over the possible effects of the European war on the South.

The telephone company has felt the war so far in but one territory, the early cotton belt. It is noticeable in the decrease in telegraph tolls among cotton men, who last year this time were using the telephone pretty extensively. It has not been felt to any great extent otherwise.

A Discussion on Railway Telephony

W. H. Clapp's Paper Considered by the American Institute of Electrical Engineers

IN March of this year W. H. Clapp read a paper entitled, "A Comparison of the Telegraph With the Telephone as a Means of Communication in Steam Railroad Operation," before the American Institute of Electrical Engineers. The paper was printed in the April number of TELEPHONE ENGINEER. At a recent meeting, the Institute discussed the paper thoroughly, and so many interesting points were brought out that we reproduce the discussion *in toto*:

WILLIAM MAVER, JR.—I think it may be safely stated that if the telephone had been invented before the telegraph and had been in use on railroads for train dispatching and the transmission of messages, up to the limit of distance of which it is capable, there would have been very little disposition on the part of railroad managers to displace the telephone by the telegraph, but when the telephone appeared the telegraph was well established on railroads, and its small cost and simplicity have served to give it the stability in railroad service that it has acquired.

The question of the more extended use of the telephone on railroads was under discussion before the Association of Railway Telegraph Superintendents at the annual convention in Wilmington, N. C., in 1899, and the chairman of the convention expressed the views of the association when he said that the railroads as a general thing do not earn large dividends, and they do not care to spend much money on telephone lines. Although the subject of the use of the telephone for train dispatching was mooted in 1899, it was not until 1907 that its use for this purpose on a large scale began, and its employment in this service imperatively demanded the development of means for rendering it practically available, which demand was met by the introduction of selective ringing.

I think the idea prevails that iron has been quite largely displaced by copper wire for telegraph purposes, and that when iron is used in new work it is to give strength to the line. One important claim for the employment of copper wire in telegraphy, in addition to its superiority electrically, has been that when iron, by reason of corrosion, has become valueless, copper wire still has high intrinsic value as junk.

My experience on frequent occasions when I have had the option of using the telegraph or the telephone over distances ranging from 200 to 1,000 miles has been quite favorable to the telegraph as a means of quick, reliable and intelligent communication between expert operators, chiefly due to an uncertainty as to certain words in telephone conversations, which frequently called for repetition. My observation of the operation of the telephone in some cases seems to indicate that when it is used regularly for questions and answers, the purport of which is generally understood by both speakers, conversation is easy. I have noticed this particularly in cases where the telephone is used as a means of communication between different sections of large manufacturing plants, where illiterate workmen exchange information freely concerning the work in which they are engaged. When, however, subjects foreign to this work are broached to them by telephone, they are often at sea. While it is true that Mr. Clapp quite properly stipulates a high factor of transmission efficiency for the telephone circuits for this railroad service, I believe that some, at least of the success of this service between dispatchers, station agents and conductors, may be due to their familiarity with the nature of the subject discussed, although, of course, the precaution of spelling out the words of train orders, letter by letter, and repeating back the order to the dispatcher is almost a sure preventive of error.

The fact that telegraph operators require months or years to become proficient is a great disadvantage of the telegraph as compared with the telephone, and the further fact that the labor element utilizes this condition to enforce its demands has, no doubt, been an important factor in forwarding the employment of the telephone for the movement of railroad trains.

Mr. Clapp makes the point that the telephone operator at a station cannot hear what is passing on the line until he cuts in, whereas the telegraph operator can hear everything. Seemingly, there is nothing to prevent the railroad telephone operator from cutting in at times from curiosity. Again, there have been cases in which it was important that the telegraph operator had heard the dispatcher's messages to other stations.

The point brought out relative to the time gained by using the telephone in the movement of trains and in other directions and the consequent saving in the payrolls of train crews, as well as the savings due to the displacement of expensive telegraph operators by less expensive telephone operators in many places, is a strong one, although the aggregate saving thus far does not appear to be great in the specific cases discussed by Mr. Clapp.

The change from the telegraph to the telephone in railroad service is quite a radical one, and has to face the condition that the telephone, like the telegraph, is not directly a revenue producer for the railroad companies, and hence does not always receive the recognition that its importance in the actual operation of the railroad system warrants. Considering, however, the fact that it is only within the past two years that any railroad officials have had the temerity to authorize the substitution of the telephone for the telegraph as a means of communication in steam railroad operation, the progress thus far made in that direction is really noteworthy.

WILLIAM E. HARKNESS.—The use of the telephone in the transaction of railroad business will be greatly increased in the future, and in many cases it will supersede the telegraph. There are, however, certain classes of railway communications which can be handled more economically by telegraph, so that we need not anticipate the complete elimination of the telegraph as a means of communication. Whether telegraph transmission in the future is to be performed manually or by machine remains to be determined, but this phase of the situation is at present receiving considerable attention.

Mr. Clapp has given figures covering the average costs of line construction and station equipment on single or double track railroads. The amount covering station equipment may be increased to as high as $200 per station on multi-track trunk lines under complete telephone operation where the number of lines entering a way station varies from five to ten. Roads of this class are, however, few.

It is interesting to note that the annual saving in overtime by the use of the telephone on the one division mentioned amounts to 24 per cent on the investment; also that the saving given does not include the saving in time of motive power nor the saving in coal consumption, which are two of many expenses which are indirectly affected. Unfortunately, these savings cannot be calculated in advance when presenting the advantages of the telephone to the railroad management.

It has been found that the train dispatcher operating by telephone is under less strain than one operating by telegraph, and can handle practically double the amount of work he has been handling by telegraph. This in some cases has resulted in the extending of his district, as mentioned by Mr. Clapp. The savings in salaries alone in such a case will approximate $5,000 annually, which is equivalent to 25 per cent on the first cost of the telephone circuit over the two districts covered.

While the cost of telephone line construction is nearly double that of the corresponding class of telegraph construction, it must be remembered that the facilities for communication have been more than doubled. In the first place, the speed of transmission has been increased. The average railroad Morse operator does not send over twenty-five to thirty words per minute, whereas by telephone the same man will transmit at the rate of fifty to seventy-five words per minute, the latter rate being in excess of the maximum manual Morse record. One factor having a bearing on this matter, which differs from that of a commercial basis, is the greater length of railway messages.

Secondly, in addition to the two wires being used for telephone conversation, they provide an additional telegraph circuit at an expense of not over $100 for auxiliary equipment for simplexing the circuit; or, if two parallel telephone circuits are available a third or phantom telephone circuit can be secured capable of good commercial transmission for distances up to 300 miles at an expense of approximately $500. In one case where this has been done, a saving of $100 per month has been made in long distance tolls at one terminal alone, and no

value placed on the time saved or increased use of the service.

The telephone for some time to come cannot compete with the telegraph in handling messages over distances of 1,000 miles or more. It is believed that the relation between long and short haul traffic will be approximately the same on railroad and commercial circuits, so that it would seem advisable to study the traffic handled before proceeding with the construction of long telephone lines.

While at present on the average railroad the telegraph is more flexible from the standpoint of additional facilities and the ease with which circuits can be patched in case of emergency, this condition will gradually change as the number of telephone circuits is increased on each railroad. It is not anticipated, however, that the telephone will be able to compete with the telegraph when it comes to making up long roundabout circuits to reach distant points. For the average division, however, the same flexibility can be obtained by the use of adjacent circuits or an interchange of facilities by connecting railroads.

It may be well to state here that the success of the telephone for train dispatching depends not upon telephone equipment, but upon the means of selectively calling the individual stations.

It is of interest to note that the difference in time taken by operators to answer a telegraph sounder call and a selective telephone call has in some cases been so pronounced as to occasion the installation of telegraph selectors on some railroads to improve the telegraph service. In fact, there has been a marked revival of selective telegraph calling in both railroad and commercial service.

It has been stated that the use of the telephone for message service demands heavy traffic. This is true when a supervising operator is employed to do the calling of stations as described, but where the circuit is arranged so that any station can call any other station, the telephone is particularly adapted for lines carrying light traffic, as, for instance, the branch lines running from the main trunk line.

With regard to the labor situation, the fact that a man is an operator is secondary to the fact that he is a railroad man, and there have been very few cases where employes have lost their positions on railroads because they were telegraph operators, and replaced by telephone operators. The railroads, however, have a larger field from which to select their employes, and they are able, therefore, to select a better class of employes than they have had heretofore.

The telegraph departments of the railroads are not earning departments and, therefore, have not been given the consideration that other departments are given when it comes to spending money. The railroad is practically inoperative without the telegraph or telephone departments, and sooner or later more consideration will be given to them.

R. N. HILL.—The implied conclusions in Mr. Clapp's paper that the telephone has a sufficient margin of merit over the telegraph as a medium for the transmission of intelligence in railroad operation to warrant its somewhat greater cost seems to be borne out by practice. We note, however, that in the comparison of costs of inside and outside plant, the facilities provided by a single telephone circuit composed of two No. 8 gage copper wires, have been compared directly with the facilities provided by one iron telegraph wire working duplex or quadruplex, and it seems that it would only be fair to recognize the fact that one pair of telephone wires is capable of supplying a telegraph circuit in addition to the telephone circuit, and that this telegraph circuit may be duplexed or quadruplexed. Also, if there are two similar pairs of wires on a pole, properly transposed, we may obtain from them not only a train dispatching and message circuit, but we may in addition obtain a third telephone circuit and a telegraph circuit; in other words, four circuits from the four wires. The cost of obtaining the additional telephone and telegraph circuit is only nominal.

Therefore, it would be more nearly fair to compare, as far as outside plant is concerned, the cost of one No. 9 A. W. G. wire with the cost of one No. 8 B. W. G. iron wire. On this basis the telephone will appear much more favorably in regard to initial cost.

I have noticed, further, that the telephone circuit which has been especially designed for use in railroad field has been referred to as the so-called "booster," and so that there will be no misunderstanding it would be well to emphasize the fact that it is only so called. It might better be called a "conservation" circuit, for, in fact, the gain in transmission which is effected, which in amount is in the neighborhood of four miles of standard cable, is due solely to the fact that we eliminate the dead loss which occurs in the ordinary telephone circuit by, so to speak, "talking out" through the receiver at that station, and receiving through the secondary of the induction coil. In still other and more general terms, it deliyers to the line when transmitting more nearly all of the energy which the transmitting element is capable of producing, and at the receiving station it uses a larger percentage of the energy available in producing the necessary effect in the receiving instrument.

I gather from the statement regarding the use of booths at frequent intervals along the right of way for use in case of emergencies that it is the usual practice to run a separate pair of wires to which these stations are connected, and to rely on a switching arrangement at an adjacent station at which there is an operator to connect the party to the train line. I am wondering if the intent of this arrangement would be to free the train wires of the load of a multiplicity of stations which are not used except at rare intervals. If so, it would seem more economical and the same result could usually be accomplished by the use of a reliable automatic cut-out switch, either operated by the closure of the door of the booth or from the hasp of the padlock, to insure that the sets were disconnected from the line when not in use. I understand this is quite common practice with a number of the railroads.

D. P. GRACE.—Regarding Mr. Clapp's paper on the advantages of the telephone and telegraph, the most interesting thing to consider, perhaps, is that, in a measure, the dispatching circuit is an automatic system, in that the supervising operator or dispatcher uses the automatic mechanism for calling the operators along the line. As time goes on it will be interesting to know how much more use is made of automatic apparatus in the general extending of the telephone system that Mr. Clapp predicts. There is a possibility that the automatic apparatus may be used at the terminals as well as in the dispatching along the line.

Mr. Clapp speaks of the delicacy of telephone apparatus and the increased cost of maintenance over telegraph apparatus. Now, it is true that the telephone apparatus as placed in the hands of the subscriber along the line is, as a rule, delicate. The telegraph apparatus, on the other hand, is much stronger. Apparatus to be supplied for a telegraph line or a telephone line, especially on a railroad, should be very substantially built, and if care is given to designing, I think much of the present maintenance charge could be eliminated.

In many railroad systems where telephone circuits have been used for message purposes there has been a great deal of trouble, due to poor transmission. This has most generally been traced to the lack of knowledge on the part of railroad telegraph people in the operation of these circuits. They have assumed that they could be used much the same as telegraph lines and have connected into the circuit many miles of rubber covered wire and iron wire, and have even run these wires through many private branch exchange switchboards, the result being that the transmission was very poor. Wherever there is an extended telephone system along a railroad there should be by all means a thoroughly competent telephone transmission engineer, who can lay out the circuits and see that they are properly connected, so that good transmission will result.

The recent storm has shown the susceptibility of the overhead wire plant to serious damage and interruption of service, Unquestionably, this part of the plant, both among the railroad companies and the telephone companies, must be improved in the near future; but whether it is going to be a case of universal installation of conduits or steel poles or concrete pole lines is yet to be determined.

Great economies would be possible in the handling of communications, in the handling of railroad trains throughout the country, if there could be some sort of combination or cooperation between the railroad companies and the telegraph and telephone companies. It is easy to see that one conduit line along the railroad tracks between the important cities of the country would furnish means of communication for all telephone messages and telegraph messages, train dispatching and the signal line service. If we are looking for economies in the handling of communications I think that is one very fruitful field that is open to us.

JOHN B. TAYLOR.—One point that I want to raise is the relative ability of the telegraph and the telephone circuits to withstand disturbances from power lines. I ask if in making reply the author will express some opinion upon this subject, as well as upon the relative ability of the two systems to continue service through different atmospheric and wet weather conditions.

In some respects the telegraph has the advantage here, in

that it is less sensitive to the extraneous currents, and in other respects the telephone seems to have the advantage, in that there is no definite current above or below which the instrument will operate or become inoperative. The transmitted current may be very small, and still be a good recognizable speech current, while in the telegraph line, if it becomes small, it may entirely fail to actuate the instrument.

W. Lee Campbell.—I want especially to call your attention to Mr. Clapp's suggestion that the use of the telephone in railroad service may be extended very much further than most railroad telegraph engineers seem to have contemplated up to date, by the railroads operating their own telephone plants at their terminal headquarters. I know of at least one large railroad which is now commencing this plan, viz., it is buying plants to install at its terminal and division headquarters, and is arranging so that any official, by calling the operator in charge of the message line, can talk direct to any station along the railroad line, and, vice versa, any official who may be out along the line at any station may signal the operator at headquarters and have her call the local official desired and connect the two together. This is something which is only possible, as a rule, where the railroad owns its own plants, because the public telephone companies which rent telephone service object to having any privately owned lines or equipment connected to their systems. I believe there is going to be a very large development along this line, and I believe that it will be a very great factor in converting the telegraph engineers and other railroad officials to the use of the telephone in the place of the telegraph.

M. H. Clapp.—Referring to Mr. Maver's statement, in stating as a disadvantage the slowness of the telegraph when discussing a subject over a wire, I imagine that this is largely due to the way one has been trained. I have never discussed many subjects at length over the telegraph; however,, I have discussed very satisfactorily many matters over the telephone for long distances. I have always had the impression that the telephone provides a quicker method than the telegraph.

As to the matter of operators cutting in on the circuit, I did not mean to imply they could not cut in and listen on the telephone circuit. The chances are, though, that they do not do this as a general thing, because they cannot attend to other duties if they are cut in on the circuit continuously; in the case of telegraph instrument, however, they can listen from different points in the room while employed at other work.

As to the matter of saving I spoke of $100 a month, but I did not mean to imply that this was the only saving; it was given only as an illustration of possible savings. Unfortunately, a great many of the savings made possible by the use of the telephone on a railroad are more or less intangible and hard to express in figures. This $200 I mentioned is an illustration of the tangible saving which we figured out in a special case.

Referring to Mr. Harkness' statement in the matter of flexibility of the telegraph over the telephone, I had more in mind circuitous routings rather than any condition on the division. I appreciate very thoroughly that by having a large number, or a reasonable number, of telephone circuits on a division the system can be made practically as flexible as the telegraph.

I also appreciate that selectors have been used successfully on telegraph circuits. However, they do not appear to be so generally in use, at least it would seem that the telephone had so many advantages over a telegraph circuit with selectors that their use in connection with the telegraph has not been considered, except in a few cases.

Referring to Mr. Hill's statement, comparing No. 9 copper with No. 8 iron, I appreciate that possibly I did not carry that comparison to a logical conclusion when considering telegraph superimposed upon the telephone circuit. In my reference to the necessity of a special telephone circuit for the use of employes along the line, I had more in mind this: Where the booths or cabinets in which telephones are placed are being used very frequently and are stationed every half mile or so, I do not believe it good practice to provide means (even with a switch) of cutting in a telephone on a dispatching circuit. It would no doubt be better to provide separate circuits and terminate the circuits in various private branch exchanges along the line.

Referring to the use of the automatic system on the railroads, I believe that it is entirely practicable, especially in shops and terminals, where the number of telephones that do not need outside connection is large. There is one disadvantage, as I see it, however, in placing the automatic system in general use on the railroad; it is pretty hard to arrange a plan for connecting the long distance lines to the automatic line.

Relative to power line disturbances affecting the telegraph and telephone, it has been my experience that power lines, electric light lines, for example, affect the telephone a great deal more than they do the telegraph. In some cases it requires special study in order to avoid the inductive disturbances.

W. Lee Campbell (*by letter*).—Mr. Clapp infers in his response to the discussion of his very interesting paper that there is some difficulty in the way of connecting automatic intercommunicating systems installed in railway terminal headquarters with long distance telephone lines, or railroad message telephone circuits. I am somewhat at a loss to understand whether Mr. Clapp meant by this that the Bell company, heretofore, has objected to connections between its long distance lines and either automatic or manual switchboards owned by others, or whether, not being thoroughly familiar with automatic apparatus, he is under the impression that it is more difficult to connect it to long distance lines or message lines than it is to connect manual switchboards to such lines. Since some members of the institute may place the latter construction on his remark, I wish, in justice to the manufacturers and users of automatic switchboards, to make it perfectly clear, that such switchboards can be and have been, for many years, connected to long distance lines just as readily as manual switchboards have been. Calls from automatic switchboards to long distance lines and vice versa are made by thousands every day.

Donald McNicol (*by letter*).—In view of the title selected for Mr. Clapp's paper I take it that in the main, its scope is intended to include only a comparison of the telegaph with the telephone as a means of dispatching railroad trains, and as a medium of communication between railroad officials and operatives for the purposes of train operation.

The extensive employment of the telephone for the purposes cited, during the past eight or nine years, furnishes conclusive evidence, that the telephone method more satisfactorily meets general railway requirements.

The points I wish to touch upon relate to the so-called "message" circuits, and to the efficient operation and maintenance of telegraph lines and equipment, with the object in view of increasing the usefulness of the telegraph.

It is quite possible that the general application of the telephone to take care of the service for which it is best adapted, has diverted attention from the possibilities in the way of increased efficiency of the telegraph.

It is stated in the paper that telegraph operators are scarcer now than formerly, and that the grade of men in this service is below that of the men engaged in the work a few years ago. My understanding is that the available supply of telegraphers has been, during recent years, considerably above the demand, and so far as ability is concerned, it is well known that the average telegrapher today can handle at least 25 per cent more messages per hour than were handled by the average telegrapher of a decade or two ago. It is further stated in the paper that the opportunities which the present-day telegrapher has to enter other fields of activity are much more frequent than 20 or 30 years ago. With reference to the situation here presented, I believe that it is very rarely now, that a telegrapher has an opportunity to get into any other electrical industry, due to the fact that specialization has rendered him unfit for any but the very low salaried places, such as "helper" or as student, and also to the fact that universities and colleges are turning out thousands of trained applicants for positions in the electrical field. Twenty years ago the head of most electrical enterprises of any importance was an ex-telegrapher, and the telegraph was the most prolific school of engineering. While the present outlook is rather forbidding to the telegrapher, it is very favorable to the telegraph; as it is now possible permanently to avail of the services of the brightest men who enter the service—those who formerly left it after becoming good electricians.

It is also stated that the number of messages that can be handled on a telephone message-circuit will average twice the number that can be handled by telegraph between the same offices. My opinion is that the reverse of this would be nearer correct—even where plain language messages are concerned. In the transmission of code telegrams, telephone handling is practically out of the question. A first-class telegrapher can handle seventy telegrams per hour all day, without hardship, on circuits practically unlimited in length. Telephone message work that I have seen done on comparatively short circuits and under very favorable circumstances, fell far below this figure in performance.

Again, it is stated that as compared with the telegraph, the telephone is a great time-saver, due to the fact that a dispatcher can transmit orders faster by telephone. It is my impression

that where train orders are copied by pencil or stylus, the dispatcher generally can transmit by telegraph considerably faster than most operators can form copy sufficiently legible for trainmen to read. This brings to notice the fact that the speed of transmission in either case is determined by the speed at which the person receiving the order can write it down legibly. Undoubtedly a skilled telegrapher can write more rapidly than a trainman or an untrained clerk. These considerations emphasize the fact that the alleged speed of the telephone over the telegraph where written messages or orders are concerned, is of no evident advantage.

Certainly, the telephone is a more satisfactory medium for carrying on short-distance conversations, especially between non-telegraphers, and the personal contact through the agency of the voice aids materially in limiting the discord resulting from misunderstanding of intent and attitude, which seems to be inseparable from the activities of train operation.

The paper states that under certain conditions the telegraph circuit is susceptible to disturbances to a greater degree than is the telephone. I ask Mr. Clapp if in this case a metallic circuit telephone line is being compared with a grounded circuit telegraph line.

In recounting the "disadvantages" of the telephone, I see no mention made of the fact that where telephones are used for train wire work, the operator has to remain at his desk with the receiver to his ear in order to be informed of what is going on, while with telegraph operation, the operator may keep in touch with what is passing over the wire while attending to other duties, and without having to remain near the instrument.

Mr. Clapp says that except in very few cases the telegraph lines and equipment on railroads are not maintained at as high a degree of efficiency as are the telephone wires and apparatus. It is also stated that "the telegraph will probably continue to handle messages for the long distance, such as 500, 1,000, or 1,500 miles, for a considerable time to come." Those in close touch with the entire subject will undoubtedly agree that this latter conclusion is well founded notwithstanding that a number of expensive attempts have been made to employ the telephone for this very purpose.

With reference to careless maintenance of telegraph lines and apparatus, it is my belief that herein are great possibilities for betterment, involving a reduced cost per message handled and a faster service. The railroad companies have in many instances availed unstintingly of expert telephone advice, in which, they have been industriously assisted by the telephone companies, while the telegraph, even for long-distance work, has been regarded as a necessary evil—something to be dispensed with, no matter what takes its place.

It occurs to me that where there are five million telegrams per year handled on one railroad, with little likelihood of the number per year decreasing as time goes on, the possibility of clipping off half a cent per message in the cost of handling, by increasing the efficiency of the telegraph, should prove an alluring prospect in these days of high aims.

Oregon Commission Recommendation on Underground

Printed rules shall be prepared by each utility and a sufficient number of copies issued that each employe who may at any time be called upon, in any manner, to do underground work or supervise same, shall be provided with a copy of said rules.

A record shall be maintained in the territorial district, division or general office of each utility, as the case may be, of the signatures of all employes so provided with copies of these printed rules, such employe's signature being an acknowledgment of service of said rules by the utility for whom he may be employed.

At all times during the progress of work in manholes, when workmen are in the manholes, or during the period when covers are removed therefrom, a competent workman shall be stationed as a guard or watchman, on the ground above, at or near the entrance to said manhole, and such workman shall at all times be in a position to supervise the immediate vicinity of said manhole and shall be so located as to have the manhole barricade and the immediate surroundings within his clear vision.

A barricade shall be maintained around the opening to the manhole and be of such type as to furnish ample protection against accidents at all times during the progress of work therein. There shall be displayed from the top of such barricade, at a distance of not less than 5 feet from the ground, a red flag of dimensions not less than 10x15 inches, and said flag shall be in such a position as to be in full line of vision from all directions. In addition thereto, from dusk until daylight the following morning, red lights shall be maintained in such positions as to warn the public approaching in any direction.

The regular manhole cover shall be replaced on same during all periods that workmen are not on duty.

It shall be the first duty of all workmen opening and entering manholes to first carefully inspect for gases, and under no circumstances shall a light of any description whatsoever be allowed to enter the manhole until it has been positively ascertained that gases do not exist therein.

In such cases as it is found necessary to use a blow-torch in wiping joints, inspection for gas shall be made immediately prior to the introduction of the lighted torch in the manhole. During such period as the workman shall be using a lighted torch or fire of any description therein, the guard above ground shall be at the upper entrance to the manhole.

Smoking in manholes or at the opening thereof shall be positively prohibited at all times.

Under no circumstances shall a fire be maintained for the purpose of furnishing warmth for the workmen in the manhole, or within a distance of 10 feet from the opening to manhole.

In all cases where it is possible, electric light shall be furnished. Where impossible to furnish electric lights, acetylene gas burners shall be maintained; the tank furnishing the gas shall at all times be located above the ground and the gas burners supplied by means of rubber tubing. Lanterns and candles should be used in manholes only in cases of absolute emergency, when making the initial inspection in cases of trouble, and when it is impossible or impracticable to secure such electric or gas lights as above prescribed.

At no time shall wax, compound, paraffine, metal, or any other substance be heated within 10 feet of the manhole opening. The furnaces or firepot for heating same shall also be maintained at a distance not less than 10 feet from the opening of said manhole.

Covered vessels containing heated paraffine, wax or compound shall never be lowered into a manhole. The cover shall be removed from the vessel not less than 10 feet from the manhole opening.

Splices in a temporary condition shall be allowed to remain in such manner only the least possible time, and shall be provided with such insulation as is common practice, and in so far as possible provide protection against moisture entering same.

In all cases the cable or cables should be returned to normal condition at the earliest possible moment, and if service be affected the work should be continuous to the end of restoring service to all patrons.

All debris, such as paper, insulated ends of wire, rubber insulating matter or any other substances of an inflammable nature, shall be removed at least once a day during the progress of the work.

The manhole shall be thoroughly cleaned of all debris upon the completion of each piece of work. A regular inspection of all manholes and cleaning of same shall be made in the spring and fall of each year.

Such rules or practices as may be in effect or employed by the utility, not in oposition to the above shall in no wise be affected or altered by these rules.

Observance of the foregoing standards is recommended by the commmission to all utilities, from the dual considerations of safety and efficiency of service. It is not deemed necessary, at the present time, to institute formal proceedings looking toward the issuance of any formal order in the premises, but such course will be followed in the event that standards of construction and maintenance are not voluntarily made such as to secure the utmost efficiency and safety in service.

Telephones to Assist Ambulance Service

In the report of the special London committee, it was stated that instead of providing call posts, the committee wished to find 3,500 telephone subscribers who would allow their telephones to be used by policemen in uniform for calling ambulances, a metal tablet being fixed on the front of the premises to indicate the fact.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Commercial Relations of the United States

The world's leading importers are the United Kingdom, Germany, and the United States, in the order named, France being fourth and the Netherlands fifth. The United States and the United Kingdom are the world's largest exporters, followed by Germany, France, and the Netherlands. The United States furnishes about 20 per cent of the total imports into the United Kingdom, 15 per cent of those into Germany, 10 per cent into France, 14 per cent into Italy, 65 per cent into Canada, 53 per cent into Cuba, 50 per cent into Mexico, 15 per cent into Argentina, and 15 per cent into Brazil. "The Commercial Relations of the United States," a volume of 272 pages, just issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, contains revised figures showing in detail for the year 1912 compared with the previous year, the articles entering into the trade of each country and the commercial transactions with the United States. This volume should prove valuable to those interested in the foreign trade of the United States and foreign countries. Copies may be obtained from the superintendent of documents, government printing office, Washington, D. C., for 40 cents each.

Banking and Credit in South America

A manufacturer's view of the financial environment of the trade of the United States in Argentina, Brazil, Chile and Peru, given in a bulletin just issued by the Bureau of Foreign and Domestic Commerce, is of special interest at the present time, when American manufacturers are looking to that field for enlarged business. No attempt is made in the bulletin to provide a technical banking report; the facts presented concern the financial conditions surrounding American trade, the disadvantages under which our exporters labor, and the experiences of other nations that have considered over-sea banking operations essential to their conquest of foreign trade. The bulletin contains lists of the principal foreign and native banks in these countries, a brief description of their monetary systems, a summary of their foreign trade, a brief outline of their banking laws, and a discussion of banking practice, credit-information service, and exchange methods. A chapter is devoted to a discussion of the various methods suggested for establishing American banks in these countries and their field of operation. Copies of the bulletin (Special agents series No. 90) may be obtained from the superintendent of documents, government printing office, Washington, D. C., for 10 cents each.

Another Kellogg Contract

The Kellogg Switchboard and Supply Company have recently closed a contract with the Independent Construction Company of Los Angeles, for the sale of a 250-line magneto switchboard, and 100 standard four-party magneto wall sets to be installed at Downey, California. The wood-work is of quarter-sawed oak, is equipped with 75 lines with an ultimate of 250 lines and has four-party selective ringing. The telephones are all four-bar with 1600 ohm biased ringers.

Test Set of New Design

The essential features of any lineman's test set are high efficiency, light weight and compact assembly. The weight should not be cut down to such an extent as to impair the talking and ringing qualities, nor should it be so great as to impede the user. In the design of the new No. 844 test set, the Stromberg-Carlson Telephone Manufacturing Company has struck a happy medium.

This set is a complete telephone in every respect; including in its equipment, transmitter, receiver, generator, hookswitch and battery. All of the apparatus is assembled in a neat compact oak case measuring 8½ by 7 by 5¼ inches, which is provided with a detachable leather carrying strap. The transmitter is the company's standard type mounted within a water and moisture proof case, sunk flush with the woodwork. The receiver, when not in use, is held in place on the top of the est by a retaining spring. Removal of the receiver from this retainer places the instrument in operative condition.

The powerful standard size four-bar generator is wired with an alternating current buzzer. This buzzer is especially useful in testing, but also serves as a signal when the lineman is waiting for instructions from the wire chief. A cylindrical two-cell flash light battery of a type obtainable at any electric shop is provided to operate the transmitter. In mounting this battery, a novel arrangement, similar to a cartridge fuse mounting, has been employed to insure rigidity. All coil windings are treated with a weatherproofing compound, so that the instrument may be used in any weather.

The Stromberg-Carlson Company will furnish interested parties with additional data concerning these sets upon application to any of its offices.

Leeds and Northrup Company's catalog No. 54, describing the L. & N. fault finder, is a booklet interesting to every telephone man. The company will be glad to send copies to anyone mentioning this magazine.

"The Splice that Never Breaks," is the title of a folder received from the National Telephone Supply Company, describing National copper tube wire connectors for splicing copper and iron wires.

A Neutral Policy

Below is a copy of a general instruction which Vice-President Swope of the Western Electric Company has issued to all departments of his company:

In view of the very intimate and close relations of our company with companies in Europe and Japan, some of which are on either side of the war, it is especially important that in writing company letters to any of these houses all partisan reference to the war and personal opinions and preferences in regard to the war should be omitted. In personal correspondence of individuals of the company in America with individuals of the companies abroad, wherever expressions of opinion in regard to the war are made, they should not be written on company stationery or enclosed in company envelopes or included in company mail.

Many of our friends from America are stationed at houses or factories on both sides of the struggle and you will assist them and assist the company also by a close observation of the above request.

Countries at War

BY EDWARD E. CLEMENT, WASHINGTON, D. C.

Great Britain—No delay is occurring in the filing of applications for patents in Great Britain, and in the payment of taxes, or in carrying through other matters relating to patents, trade-marks or designs in Great Britain. Mail goes and comes direct.

France—I have been unofficially advised that notice has been issued by the French government extending indefinitely the time for paying taxes on French patents, and also providing for the filing after publication of applications for patents, which in the ordinary way would result in the grant of invalid patents. The time for effecting working of patents is also extended in France indefinitely in the notice referred to. The mails to and from France are direct and also by way of London.

Belgium—I am informed that the removal of the seat of government from Brussels to Antwerp has not entirely suspended the operations of the Patent Office, and we have direct mail service.

The Belgian law provides a generous period for paying taxes after their due dates, but it is more than likely that additional extensions will be granted for taking care of patents that become due for renewal while the war is on, and with regard to the filing of applications, the Belgian law provides for the grant of valid patents after publication elsewhere. The ambassador for Belgium in Washington may, however, accept renewal fees, and no difficulty will be experienced in maintaining patents in that country.

Germany—I have been unofficially advised that a three months' extension for effecting amendments on all German applications has been granted, and presumably this extension will apply to the payment of taxes, filing of appeals, and other matters connected with the prosecution and up-keep of patents, designs and trade-marks in Germany.

The German imperial consulates may be ordered to receive and give receipts for fees and taxes on German patents, and such payment of fees will then be equivalent to payment direct to the German patent office. Mails are by way of Denmark and Italy.

Austria-Hungary—A moratorium has, I understand, been passed by the Austrian government, under which taxes can be paid after their due date, but the period for which the moratorium is to extend has not yet been communicated to me. The mails are the same as for Germany.

Sweden—The moratorium passed on the fifth of August by the government of Sweden, extends the time for one month wherein to effect payment of renewal fees, and presumably will also extend the time for the filing of new applications in Sweden, but as to this I have not yet had advices from my agents. One month's extension for paying taxes due after the fifth of August is, I understand, provided for in the moratorium. The mails are direct and via England.

Russia—Some considerable delay arises in communicating with Russia, and I have not so far been advised of any relief measures that have been issued by the Russian government. Doubtless proper extensions will be granted for paying taxes, and to prevent any prejudicial result arising from the publication of inventions which might affect the grant of valid patents in Russia.

Efforts are being made through the ambassadors of the different countries at war to provide here for the payment of taxes, and the filing of applications, but such arrangements will be unnecessary if long extensions are granted by the various countries now involved in the war.

Where money has to be transmitted abroad, the cost of paying taxes, etc., will be somewhat increased owing to the war taxes and high rate of exchange at present ruling. About 20 per cent has to be added to German fees, for example.

Ohio Convention in October

The committee appointed by the directors of the Ohio State Independent Telephone Association to fix a date for the annual state convention, met in Columbus, September 19, and decided on Thursday and Friday, October 29 and 30; convention to be held at the Hartman Hotel, Columbus, Ohio.

An interesting program will be arranged in a short time. The first day of the convention will be devoted to general topics for discussion, which will be of interest both to the investor and operator. A banquet will be given in the evening. The second day will be given over to operating and technical discussions which will be of great interest to all.

The directors expect to have a large and enthusiastic meeting—in fact, a real old-fashioned telephone convention. A cordial invitation has been extended to the officers and members of all other state associations. Invitation is also extended to manufacturers and dealers in telephone apparatus.

Lines Out of Germany Disconnected

The cutting of cables and telegraph or telephone wires is the main cause of the lack of war news out of Germany, according to word received from Arthur J. Conger, who is in charge of the Associated Press Bureau at Berlin. The communication to Mr. Foley was sent by person to New York, where it was mailed.

Mr. Conger says there is no way of communicating with the outside world except as in the case of his recent communication, which was sent by a friend to America for mailing. All cables are cut and telegraph and telephone wires throughout the country have been so disabled that it is impossible to communicate even locally. Cafes and all places of amusement are closed, as there is no one to patronize them or no one to operate them. Women are running the street cars and doing the usual work of man while the men are at the front.

Unsettled Conditions Halt Plans

Plans for the refinancing of the Inter-State Telephone and Telegraph Company, Joliet, Ill., have been halted by the outbreak of the war and the unsettled financial conditions resulting. This was the substance of a letter received by J. M. Brown, the company's Joliet agent, from Auditor G. J. Beverley, of Aurora. The majority bondholders are now working on a plan for the readjustment of the finances of the company, which will be submitted to the minority holders as soon as it can be prepared.

All of the present officers of the company were re-elected at a meeting of the directors held in Toleda, Ohio. A meeting of the officers will probably be held in Aurora in the near future.

The officers of the company are E. J. Marshall, Toledo, president; E. L. Barber, Aurora, vice-president, and E. H. Cady, secretary and treasurer.

The Holtzer Cabot Electric Company is using as envelope stuffers interesting folders describing the factory type of Reacto horn and the Flexiphone.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

When Bert H. Peck, former city telephone supervisor of the city of Chicago, resigned that position to join the force of W. J. Hagenah, Father Dearborn looked around for a man equally capable of filling the place to organize the forces of the city telephone bureau to the same point of efficiency as is found in private enterprises. Obviously the work called for some one intimately familiar with local telephone conditions in Chicago and likewise technically trained to decide the intricate questions which appear so frequently in this department. Such a man must necessarily have been in the employ of the Chicago Telephone Company, for this corporation's service predominates in Chicago. It is safe to say that the right man was found in G. Willis Cummings, who took charge of the Telephone Bureau, which is a branch of the Public Service Department under Commissioner Montague Ferry, on August 20, 1914. Mr. Cummings was born November 2, 1847, at Highland Park, Illinois, and is of American extraction. He attended grammar school at Highland Park, graduated from Western Military Academy in 1893, and later atttended Armour Institute. His entrance into the telephone field was in 1895 as relief operator for the Chicago Telephone Company at Highland Park in his father's drug store. Later he was employed by the Kellogg Switchboard & Supply Company in various departments, being in charge of its power installation work for a time. Then he became North Shore manager, and while there aided materially in the development of the present common battery telephone circuits. From 1901 to 1903 he had charge of the independent system at Shelbyville, Ind. The Bell Telephone Company, recognizing his ability, brought him to Chicago in 1903, where he collaborated with J. J. O'Connell in original research work, which developed the four-party selective ringing circuit used in Chicago at present. During the past eight years Mr. Cummings established the plant department school of the Chicago Telephone Company and developed it to a point where it is now recognized as the finest educational institution of its kind in the telephone world. This school has trained over 6,700 men in standardizing methods of construction, installation, equipment, maintenance of telephones. It was also a clearing house for exceptional or extraordinary problems in telephony which called for immediate solution. All these came to the immediate attention of Mr. Cummings and, consequently, put him in personal touch with the entire field. It is doubtful if any one man in the telephone field has had the opportunity to gain a more intimate knowledge of plant conditions, subscribers' complaints, or, in fact, the entire telephone situation in Chicago. "Electricity and Magnetism in Telephone Maintenance," of which he is the author, enjoys an enviable reputation among students of up-to-date manual telephony.

G. Wilson Cummings.

Thomas E. Hughes, manager of the Philadelphia office of the Standard Underground Cable Company, died at his residence, Atlantic City, N. J., August 27, funeral services being held in Philadelphia on Monday, August 31. Mr. Hughes had long represented the Standard company throughout its Atlantic coast territory from Philadelphia south and for the past seventeen years had been manager of its eastern and southeastern branch office sales department located at Philadelphia. During the period of his association with the company he had seen the number of its branch offices increase more than fivefold, and the annual business done in the Philadelphia office territory during recent years grow to a figure equal to that of the company at large seventeen years earlier. Mr. Hughes had been a well-known figure in the electrical field practicallly from its commercial inception and a host of friends among his customers and associates will not soon forget his unusual personality, with its large capacity for friendship and its unusual mental aggressiveness which was his to the end. Mr. Hughes, while about to return from a visit to Bermuda for his health in the spring of 1913 suffered a stroke of paralysis, from which he recovered sufficiently less than a year later to partly resume his regular duties. He leaves a widow and two daughters. For a number of years he was secretary and director of the Manufacturers' Club, Philadelphia, and active and influential in securing its present location, and until his death took a great interest in the club's activities. Prior to his connection with the Standard company Mr. Hughes was connected with John A. Roeblin's Sons Company at Trenton and Scranton, and with the Washburn & Moen Manufacturing Company at Worcester, Mass., and Pittsburgh. Announcements as to Mr. Hughes' successor will be made later by the home office.

W. W. Hibbard, manager of the Mountain States Telephone Company at Big Timber, Mont., has been transferred to Round Up.

The directors of the Mutual Telephone Company at Villica. Iowa, elected Glen Fisher of Prescott as manager, succeeding William Hudson, resigned.

M. D. Soule, district foreman for the Northwestern Telephone Company at Sioux Falls, S. D., has left for Fargo, N. D., where he will take up similar work for the company.

E. R. Kohlhase has been appointed district plant chief of the Cumberland Telephone Company at Knoxville, Tenn., succeeding O. C. Rauchenberg, who has been appointed division plant of the Georgia division.

Nat W. Lillie, purchasing agent for the New England Telephone Company at Baltimore, recently severed his connection and is now residing on his farm at Laconia, N. H. Mr. Lillie was one of the oldest officials of the telephone industry, having entered the telephone business in 1877.

S. B. Naff, who has been associated with the legal department of the Southern Bell Telephone & Telegraph Company for a number of years, has been appointed attorney for the company. Mr. Naff will continue to make his headquarters in Atlanta, Ga.

Frank Farrar, who has managed the Eufaula exchange of the Southern Bell Telephone Company in Alabama for four years, has left for Opelika, where he will act in the same capacity for the company.

Hon. O. F. Berry of Carthage, Ill., has resigned his position with the interstate commerce commission to accept that of general counsel for the Illinois Independent Telephone Association.

M. McMillan, who for the past five years has made his headquarters in Parkersburg as superintendent of the outside lines of the West Virginia Western, has resigned his position with that company to accept a more important one with the Bell Telephone Company, with headquarters in Cleveland, Ohio.

The Farmers' Mutual Telephone Company of Hopkins, Mo., is now managed by Charles Alexander.

Edward J. Hall, "father of the long distance telephone" and vice-president of the American Telephone & Telegraph Company, died at New York, September 18. He came here from New York some weeks ago for his health. Mr. Hall's death was sudden and unexpected. Although Edward Julius Hall was a leading personality in the development of the Bell telephone commercially, and, more than any other individual, active in the growth of the long distance telephone throughout the country his name was next to unknown to the public at large because of a lifelong aversion to publicity. He was born at Perth

Amboy, N. J. The boy attended Buffalo elementary schools and then entered Yale, being graduated from the Sheffield Scientific School in 1873, or two years before Bell perfected the telephone. The invention of the telephone was of much interest to him. When in 1877 the parent company of the Bell company was organized he decided to get into the new industry and a year later he organized a local operating company in Buffalo, holding the offices of vice-president and manager. On New Year's day, 1885, Theodore N. Vail, now president of "Tel & Tel," held a conference, as a result of which Mr. Hall took over the management of the new company just organized, the American Telephone & Telegraph Company. For more than a year ill health had prevented Mr. Hall's active participation in business and he had been absent from his New York offices in Dey street for several months.

W. A. Stedman of Louisville has been appointed assistant manager fo the Birmingham exchange of the Southern Bell Telephone Company of Alabama.

George A. Ford, for many years identified with local telephone interests, has been appointed manager of the Toledo Home Tlephone Company, succeeding O. O. Welsheimer, who has been transferred to Columbus to take charge of the home office of the Ohio State Telephone Company.

C. R. Lockwood has resigned as manager of the Wood County Telephone Company of Ohio. His place has been taken by P. J. Martin, former wire chief of the Central Union here.

J. C. Flippen of Gloster, Miss., has been made manager of the Donaldsville exchange of the Cumberland Telephone Company of Louisiana, succeeding Charles T. Norsworthy. Mr. Flippen took charge September 6.

D. E. Reed, recently of Waco, Texas, has succeeded R. L. Galloway as local manager of the Independent Telephone exchange at Mart.

The following officials of the Bell Telephone Company have been on a tour of inspection in the various states inspecting the buildings, equipment, etc., of their company: L. H. Kinnard, vice-president and general manager; J. H. Crossman, Jr., general commercial superintendent of Philadelphia; T. P. Sylvan, assistant to the president, of New York; W. B. Clarkson, division manager, of Pittsburgh, and Z. C. Gillespie, sublicense agent, of Pittsburgh.

J. H. C. Watts, a pioneer in telephone enterprise of this country and in his youth one of England's best oarsmen, died at Baltimore, Md. He was 73 years old. Mr. Watts and Prof. Alexander Graham Bell perfected the electric instrument that located the bullet which caused the death of President Garfield.

Frank E. Bohn, assistant secretary and manager of the Home Telephone Company, Fort Wayne, Ind., has been made secretary of the Independent Telephone Company Association of Indiana.

NEWS FROM THE FIELD.

ALABAMA.

A telephone line is being built from Leeds north, connecting with Moody's Cross Roads, Asmar, Branchville and Odenville.

ARKANSAS.

The Southwest Arkansas Telephone Company at Prescott has changed hands, effective October 1. Penny D. Frisby of Prescott and John Frisby of Morrilton have sold their interest to another brother, Monroe Frisby, of Greenwood, who will move to Prescott and assume charge of the plant October 1.

At a meeting of the town council of McRae, held recently, a franchise was granted to William Todd of McRae to install a modern telephone system, the work to begin at once.

A corporation is now being organized to take over the Deen Springs and Dyer telephone exchanges for the purpose of making many necessary improvements and in addition to giving both day and night service. These two exchanges will be consolidated with central office in Alma, that city having granted the new corporation a fifty years' franchise.

A crew of the Southwestern Telegraph & Telephone Company has begun the work of reconstructing the Conway telephone exchange's lines in the business district. All of the company's wires and poles will be removed from the streets and placed in alleys.

The Waldron Telephone & Exchange Company of Waldron has been chartered, with a capital stock of $7,500. The officers are J. S. Hill, president; C. E. Forrester, vice-president, and G. S. Forrester, treasurer.

A recent fire destroyed the cables of the Newark Telephone Company to the extent of $400.

CALIFORNIA.

The commission has granted the Home Telephone Company of Covina an extension of time in which to issue the $87,700 bonds previously authorized by the commission. The company will have until August 1, 1915, to take advantage of the commission's authority.

The forest service is busy improving and extending its telephone lines in Downieville. A new line is being built from the Casserly place on Goodyear Creek to the Red Ant staion, near Monte Cristo; also a line from Rocky Peak to Downieville, via Goodyear Bar, Sardine Flat and Sierra City will be connected up by telephone, the line extending on from Sierra City into Henness Pass.

The Roseville Telephone Company operating at Roseville, Placer county, has filed an application with the railroad commission asking authority to issue fifty shares of capital stock of the par value of $10 per share. The company represents that the sale of this stock is necessary to furnish funds to pay for labor and material used for construction since April 1, 1914.

With the completion of several lines of telephones in the Plumas national forest in Butte and Plumas counties it is now practically encircled and crossed in many places by telephone wires, which can be used to sound an alarm practically the instant a forest fire is discovered. The lines recently completed extend from Yankee Hill to Magalia, from Magalia to Big Bar, from Big Bar to Flea Valley and from there to Quincy.

The Pacific Telephone & Telegraph Company of Hanford have commenced improving their local service at an expense of about $5,000.

Oakland can be proud of the cable laying lighter belonging to the Pacific States Telegraph Company, generally lying at the De Fremery wharf, in command of Captain Bill Thomas, which is ready at a moment's notice to lift and repair a cable which may be broken or lay a new one, as is desired.

At a meeting of the ranchers of the Upper Tule district the preliminary steps were taken for the organization of a rural telephone system which will be connected with the Porterville exchange.

Although no definite statement has been made by any of the stockholders, it is believed that the Glenn County Telephone Company may decide to offer its plant and system for sale to the Pacific Telephone & Telegraph Company.

FLORIDA.

The Peninsular Telephone Company will install a complete common battery plant in Lakeland and by this means "central" will be signaled by removing the receiver from the book.

IDAHO.

The Mountain States Telephone & Telegraph Company is expending approximately $4,000 in the construction of sixteen miles of new rural telephone lines in the Deer Flat section south of Nampa. The extension will be served by the Nampa central office and will accommodate more than fifty new patrons. The construction work commenced the first of September and it is anticipated the service will be completed not later than October 15.

A private telephone line is being constructed from the James Laidlaw ranch at Muldoon to Bellevue. The enterprise is financed by J. J. Gray and James Laidlaw, two well-known sheepmen, and G. B. Prunty, a farmer. The poles upon which the line is to be strung have been set to the top of the Muldoon summit and the poles for the balance of the line are on the ground. As soon as this line is completed another one will be built from the Laidlaw ranch to the John Wright ranch on Little Wood River; thence to Carey.

Interstate Utilities Company, Coeur d'Alene, $1,000,000. To carry on general telephone, telegraph and messenger business and gas, water power and electric light business. Incorporators: Philip Hawley, Spokane; Edwin T. Coman, Spokane; Eugene D. Brink, Sr., Coeur d'Alene.

ILLINOIS.

The Central Union Telephone Company will build a new toll line from Princeton to Galesburg at an expenditure of $35,000.

Three-quarters of a million dollars will be expended by the Chicago Telephone Company to increase long distance telephone facilities between Chicago and north shore cities and other points in Cook, Lake and McHenry counties as far west as McHenry.

Ten minutes was taken by the Chicago Telephone Company August 9 to "cut over" the old Irving exchange at North

Forty-second avenue and Irving Park boulevard to the new Irving exchange, a mile away, at Belle Plaine and Spaulding avenues, Chicago.

The state utilities commission has granted the Byron Telephone Company the right to charge toll in Ogle county, in accordance with the scale which the company adopted the first of the year.

The work of improving the telephone system in Oneida will begin in a short time.

More than half a million dollars will be expended by the Chicago Telephone Company to construct and equip its new Prospect office in Claremont avenue, south of Sixty-third street, Chicago, and to extend its underground cable facilities to connect the new office with all other city exchanges. Construction of the new building has been started. Thirty miles of underground cable, containing 20,000 miles of wire, will be laid. The company will spend $200,000 on the cable work.

The Central Union Telephone Company has made application to the Rock Island city council for permission to install underground conduits along Seventh avenue boulevard between Thirtieth and Forty-sixth streets and on Eighteenth street from the alley between First and Second avenues to the river. It is expected that the permission will be granted.

The Bell Telephone Company has commenced the job of painting the telephone poles in Sterling as recently required by ordinance.

Buncombe Metallic Telephone Company, Plymouth; capital stock, $800; telephone purposes. T. A. Scott, F. E. Hendrickson, F. A. Scott, G. F. Hendrickson and David Holton.

The Central Union Telephone Company has completed its improvements in Rock Falls.

George D. Bridgland, secretary of the Illinois Mutual Telephone Company of Seward, has sent out notice to the stockholders that commencing from August 1, 1914, the rate for their telephone would be $12 instead of $6, as charged heretofore. This change in price is made according to the public utilities act, which governs all telephone companies as well as other public service corporations.

The Chicago Telephone Company paid into the treasury of the city of Chicago August 29 $221,993.36, 3 per cent of the $7,399,778.52, the gross income of the company for the past six months. The exchange revenue of the company for the last six months was $6,535,589.25 and the toll revenue for the same period was $493,606.90.

The Chicago Telephone Company has declared the regular quarterly dividend of 2 per cent, payable September 30 to stock of record September 29.

The Seymour Telephone Company has purchased a new cable and cable terminal.

The question of increasing the capital stock of the Rockford Home Telephone Company by $100,000 to finance the installation of an automatic exchange system will be considered at a directors' meeting to be held October 15.

The Foosland Telephone Company has decided to enlarge its office and exchange building. The contract will be let at once.

The Illinois Central has appropriated $50,000 for the equipment of the line between Clinton and Centralia with the telephone system of train dispatching. Experiments with the telephone system on other divisions have been uniformly successful and the company now has 3,500 miles of track which are controlled by telephone train dispatching.

The former Latham telephone exchange is now operated by the Mt. Pulaski corporation.

At the annual meeting of the stockholders of the Ogden Telephone Company September 12 the following directors were elected: James Scott, P. M. Dailey and James Skinner. Officers of the company were re-elected as follows: President, Henry Cardiff; secretary, Albert Anderson; treasurer, Miss Bertie Freese.

INDIANA.

Lowell Telephone Company of Lowell has filed notice of dissolution.

The Consolidated Telephone Company of Hendricks county at its annual meeting elected three directors: P. R. Greist, New Haven, Conn.; Dr. Amos Carter, Plainfield, and J. J. Browne, Indianapolis. The directors elected Dr. Carter president; P. R. Griest, vice-president; J. J. Browne, treasurer and manager, and Miss M. Kelley Roberts, assistant manager and bookkeeper. A dividend of 2½ per cent was declared.

The Central Union Telephone Company has completed a new central office similar in operation to the other exchanges of this company in Indianapolis, replacing the present Broad Ripple exchange and supplying service to the subscribers formerly connected through the Broad Ripple office. Washington has been chosen for the prefix for this exchange.

The Union City Telephone Company, Union City, has increased its capital from $50,000 to $145,000.

The Corunna Telephone Company of Corunna has been granted by the public service commission of Indiana an increase in rates of from $1 to $1.10 a month, provided the dues are not paid by the tenth of the month. If paid before this time the rate is to remain at $1.

The public service commission of Indiana refused the Mooreland Rural Telephone Company permission to raise the rates $3 a year on rural connections.

An order was issued to the Alford Telephone Company of Fortville, permitting it to do business by the public service commission of Indiana.

The Merom Telephone Company in Sullivan changed hands September 5, Ray Redifer, manager of the Merom Electric Company, purchasing 51 per cent of the capital stock. Joe Long, A. L. Nichols and Robert Clark have been the stockholders, with Mr. Clark as manager. Redifer will move the plant into the Vern Nichols building and install new telephone equipment.

The Carthage Telephone Company, Carthage, has dissolved.

Hebron Telephone Company, Hebron; capital, $10,000; telephone business; directors, Stanley Casebere, John Wilkinson and Marguerite Casebere.

The telephone switchboard at Garfield has been removed by the Central Union and the patrons will have to hitch onto the Crawfordsville or the Darlington switchboard to get service in future.

IOWA.

Work on the improvement of the Wilton telephone system has been started. The improvements consist of the recabling and rewiring of the entire town and the installation of new switchboards and cross connecting and testing racks. New poles will be set and underground cables will be used in some parts of the town.

The Iowa Telephone Company plans to make extensive improvements in their system at Monticello.

The local office of the Iowa Telephone Company at West Union has leased the rear second story rooms in the T. R. Stam building, to be occupied by them as offices and exchange.

The Western Electric Telephone system will string new cable in Algona and enlarge the switchboard at "central." These additions to the plant will cost about $6,000.

H. L. Cartwright, proprietor of the Union Mutual Telephone at Union, will retire from the telephone business. He has leased the plant to Nelson Hollingsworth of Bangor, possession to be given October 1.

KANSAS.

The construction crew of the Missouri & Kansas Telephone Company, which has been at work reconstructing the company's local plant and bringing the service up to date, will finish at Coffeyville within the next three weeks, at which time over $45,000 will have been expended in the improvement of the property.

The Medicine Lodge Telephone Company, owned and operated by O. W. Chase, has been sold to the Arkansas Valley Telephone Company, which has its headquarters at Great Bend. The new company is building a central station with offices and all switchboard appliances adequate to handle the increasing business. A complete set of new phones will be installed and the whole system will be new.

The Kansas public utilities commission has refused the Emporia Telephone Company the right to raise its telephone rates on party lines from $1 to $1.25 a month.

The Bell Telephone Company has decided to move their division traffic offices now located at Springfield, Mo., to Coffeyville. W. B. Bentley, division traffic superintendent, will come here immediately to take charge of the offices. This will put a big territory in charge of the Coffeyville offices, which will extend as far east as Springfield, Mo., north as far as Chanute and west as far as Cedarvale.

KENTUCKY.

The Campbellsville telephone exchange in Campbellsville was totally destroyed by a recent fire.

Duncan Farmers' Telephone Company, Duncan; capital, $3,500. Incorporators: W. I. Massie, G. B. Poulter and John E. Sims.

Hutchinson Telephone Company, Crockett; capital, $225. Incorporators: J. E. Ferguson, Robert Gilliam, T. P. Conley.

Milton Young, who brought suit in the federal court in Frankfort to dissolve the merger of the Fayette Home and

East Tennessee Telephone companies, September 1 dismissed the suit without prejudice.

MARYLAND.

The public service commission has applied to Governor Goldsborough for permission to employ Alfred D. Bernard and Thomas J. Lindsay as experts in valuing the real estate of the Chesapeake & Potomac Telephone Company of Baltimore. The valuations are wanted by the commission as part of the testimony to be taken at the hearing of the petition filed by the Telephone Subscribers' Protective Association for readjustment of the rates of the telephone company. The hearing will begin about October 1.

MICHIGAN.

At the annual meeting of the Onaway-Alpena Telephone Company recently it was announced that the Michigan railroad commission had granted the company permission to bond for $58,000. The company will build a new home and generally improve the system.

The Bell Telephone Company is removing its poles from the roadway leading between Humboldt and Champion.

Fifty thousand dollars is the amount appropriated by the Michigan Telephone Company for improvements on its local lines in Kalamazoo. Work will be started at once and, according to the local manager, it is hoped to have all of the improvements completed by November 1. Many of the lines will go underground.

It is expected that the Interlaken Telephone Company will be in its new home at 215 Lockwood street, Alpena, by December 1.

MINNESOTA.

The Northwestern Telephone Company is planning on some changes in their lines in Evan.

The farmers near Atkin will soon have a telephone line, as the material has arrived and work will be started immediately. The line will accommodate about twenty farm houses and is being financed by the farmers.

The Hibbing exchange is now handling the Buhl long distance calls instead of the Chisholm office.

MISSISSIPPI.

The Cumberland Telephone Company will expend $7,000 in extending its system in Clarksdale. Most of the money will be spent for additional cables.

The announcement has been made that the Cumberland Telephone Company will erect in Meridian at the corner of Twenty-third avenue and Seventh street a modern brick telephone building.

MISSOURI.

The Bell Telephone Company has finished the new telephone line it has been building between Trenton and Chillicothe.

The work of building a new telephone line from Maryville to Graham will start within a short time. One-half of the cost of building the line will be paid by the Mutual exchange of Maryville and the other half by the Graham exchange. The new line will be the only direct mutual line from Maryville to Graham.

MONTANA.

The Mountain States Telephone & Telegraph Company is about to start work that will mean a total investment of $100,000 in Livingston and Park county. A copper line will be constructed connecting Livingston and Willsall. The wires in the business district of Livingston are to be laid underground and the system generally overhauled and repaired.

The Havre Electric Company at Havre is completing plans for the erection of a new telephone exchange building, costing about $50,000.

The Mountain States Telephone Company has commenced the installation of the underground cable system, which will replace the present overhead system in Miles City. The company is completing a two-story and basement building of pressed brick and the underground system is a part of the improvement plan.

Simms' local telephone system is now fully in operation.

Consolidation of Billings' two telephone systems will be perfected during the month of October.

August 31 was the last day of operation of the Independent or Home Telephone Company in Bozeman, Manhattan and Belgrade. In Manhattan and Belgrade the Home company will withdraw and the Bell company will operate the exchanges, using the Independent equipment.

The Bell Telephone Company has made arrangement to rebuild its main service line on the west end, from Alberton to Lookout, a distance of 100 miles.

NEBRASKA.

The new switchboards for the consolidated telephone service of Harvard have arrived and are being put in place by a force of experts.

The application of the Nebraska Telephone Company of Lincoln to the state railway commission for permission to issue and sell bonds in the amount of $1,500,000 has been granted by the commission. With the application it is given that $1,350,000 of this is to retire outstanding demand notes bearing 6 per cent and the balance of $500,000 to be used for future construction.

The state board of control has let the contract for the installation of an intercommunicating telephone system at the Norfolk Hospital for the Insane.

The railway commmission has granted the request of the Lincoln Telephone Company to install a special ten-party line into Trumbull and Doniphan, to be connected with the Hastings exchange or one of the exchanges in the Hastings zone, and to receive free service with the Hastings exchange, the rate to be $3.25 a month gross or $3 a month net. The service is already being given.

The Nebraska Telephone Company has paid to the secretary of state $775 as its occupation tax for 1914, based on $6,000,000 capital stock issued and outstanding.

The state railway commission granted the Farmers & Merchants Telephone Company of Alma permission to issue $8,000 worth of five-year notes and $6,000 worth of additional stock. The company now has $15,000 in stock and $7,600 in short time notes outstanding.

Work on the new telephone line in Elk Creek will begin in a short time.

Work will be started at once on the construction of a phone line from the south divide to Glen, a distance of fifteen miles. A line will also be run from Glen to Crawford for the convenience of the farmers of the south divide.

NEW JERSEY.

Vice-Chancellor Backes has appointed George L. Wright of Paterson receiver for the Paterson, Passaic & Suburban Telephone Company on application of James Kerney, receiver for the Interstate Telephone & Telegraph Company of New Jersey, which owns the Paterson company. Mr. Wright's bond was fixed at $25,000.

An ordinance giving the Bell Telephone Company a fifty-year franchise in Westville has passed council on first reading and considerable objection to it has developed.

NEW MEXICO.

The Mountain States Telephone & Telegraph Company will install a telephone in the Santa Fe depot at Dona Ana.

NEW YORK.

The upstate public service commission has ordered a substantial reduction of telephone rates in Dexter and has recommended a reduction in Brownsville.

According to present indications the Bell Telephone Company's new building in Henry street, Binghamton, will be finished and ready for occupation by November 1. The large swtchboard for the telephone exchange is now being installed, but will not be completed until spring. The new building will be one of the best equipped of its kind in the state. The exchange will be on the third floor, the wire chief's office and the terminal room on the second, while the first floor will be utilized for the commercial offices.

The Theresa Telephone Company, of which George D. Walradt is the local manager, has begun work on some extensions that the company will put through this fall and that will add some twenty-five new phones to their list, the largest extension which the company has made in some time. The extensions go into sections not before served by any phone line and that are considerable distance from the village.

The Rochester Telephone Company is planning to begin work on its new building in Frost avenue early in the coming year. The building, which is to be two stories, over a basement, will have an immediate capacity of 1,500 direct lines, with 3,500 direct lines ultimately or proportionately more of party lines. It is estimated that the exchange with equipment and cable connections will cost approximately $130,000. The lot upon which the new exchange is to be built has a frontage of 63 feet in Frost avenue and a depth of 115 feet and is nearly 100 feet east from Genesee street. The exchange will serve the southwestern part of the city roughly bounded by Smith street on the north and Jefferson avenue on the east. A similar exchange to serve the northwestern part of the city is soon to be erected in Brozel street.